CHEMICAL INDUSTRIES

. . the business magazine for makers and users of chemicals

Management • Research • Production • Marketing

Volume 45 Number 6

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And just a last word—do stop in at Booth 28 during the Chemical Show, Dec. 4-9. Rest yourself, let us answer your questions, and be sure, of course, to see our exhibit of 387 new chemicals developed in the last two years.

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R. T. Baldwin, L. W. Bass, F. M. Becket, B. T. Brooks, J. V. N. Dorr, C. R. Downs, W. M. Grosvenor, W. S. Landis, and M. C. Whitaker.

Publication Staff

Williams Haynes, Editorial Director; Walter J. Murphy, Managing Editor; W. F. George, Advertising Manager; L. Chas. Todaro, Circulation Manager; John H. Burt, Production Manager.

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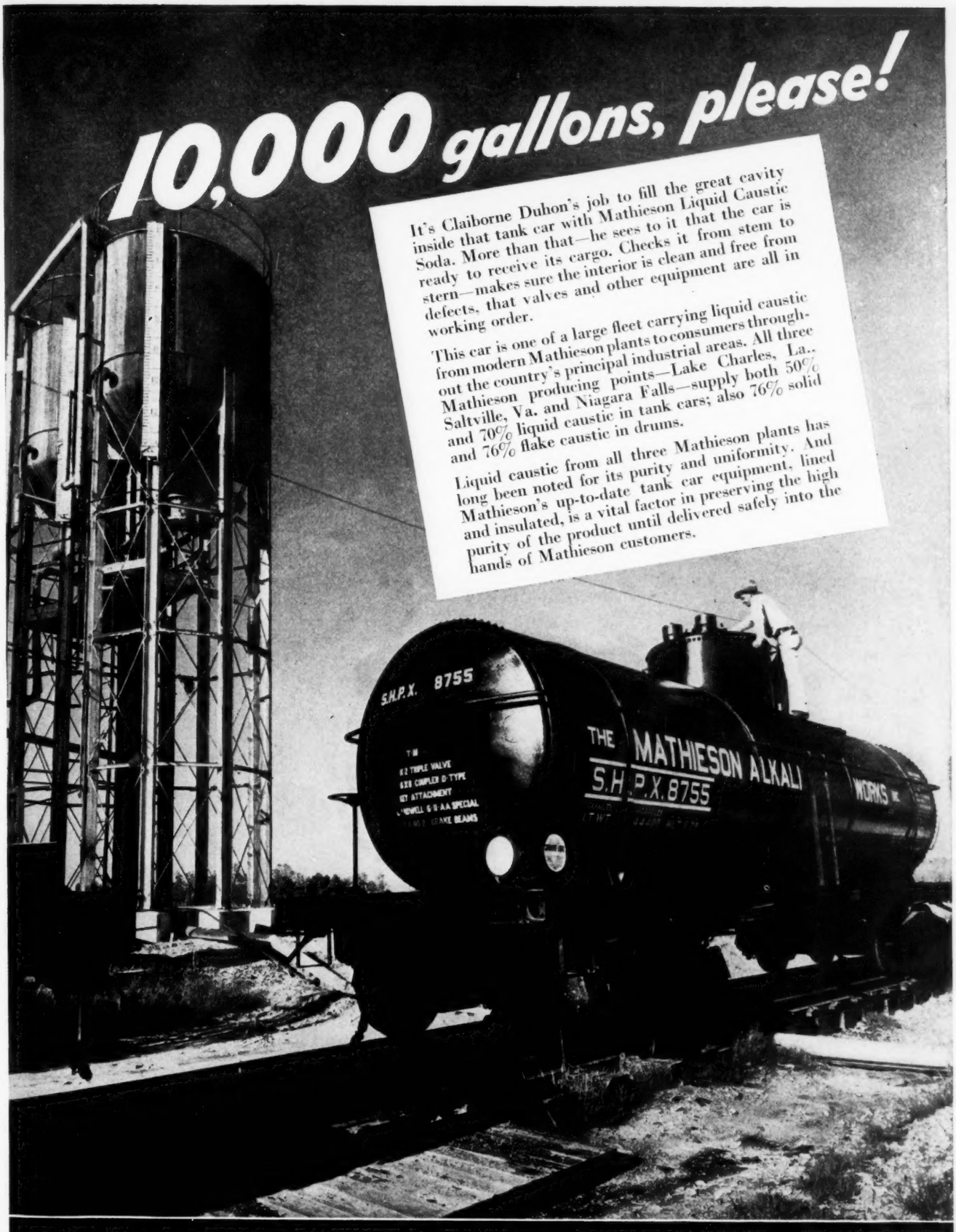
Liquid caustic from all three Mathieson plants has long been noted for its purity and uniformity. And Mathieson's up-to-date tank car equipment, lined and insulated, is a vital factor in preserving the high purity of the product until delivered safely into the hands of Mathieson customers.



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The Reader Writes:—

South American Trade

Dr. Hessel's article analyzing Latin American chemical trade was splendid and of course, very timely.

This business of export trade is a very serious one and I sincerely hope that we do not make all the mistakes that we did during World War 1. Then we looked upon our newly found export trade as a windfall. We failed to study how to hold that trade when the conflict came to the inevitable end.

We must by some means determine all of the peculiarities of each one of the Latin American countries—what they buy, how they buy it, what terms must be agreed upon, how the goods must be packaged, labeled, etc. These are only a few of the details that must be thoroughly understood if we are to be successful in holding permanently the markets that are being handed to us at the moment on a silver platter.

ARTHUR DEVINNE,
Chicago, Ill.

Tri-Sure Needs No Compound

In reading your September issue we came across the news release concerning Sauereisen Pipe Joint Compound appearing on page 293. You may not have realized that the cut accompanying that news release showed one of our Tri-Sure closures, but when you consider the Tri-Sure closure in section shown on the attached photograph you will no doubt appreciate the similarity.

Editorial Note: This cut shows the photograph of the Tri-Sure closure referred to above. Our sincere apology to American Flange & Manufacturing Co., Inc.

The Tri-Sure drum closures which we have been manufacturing for nearly twenty years have received universal acclaim throughout the world due to their elimination of troublesome leakage. No compound or filler of any kind is needed in conjunction with Tri-Sure closures. They are complete and adequate in themselves, they are leak-proof and they eliminate the other undesirable factors listed in the statement forming part of your release. Our position as the world's largest manufacturer of drum closures attests to this and we have made it known through our advertising in a large number of publications.

ALBERT M. PARKER,
Patent Department,
American Flange & Manufacturing Co., Inc.,
New York City.

Watch for December Particularly

We suggest that you write up in the same tone as your "Creating Industries" series products recently developed by the industry's leaders. For example, du Pont's nylon, Lederle's sulfapyridine, etc. Also unusual plants, such as Dow's bromine plant, Mathieson's new salt cake plant, etc. Compete with Fortune Magazine on a limited scale.

STATISTICAL DEPARTMENT,
Burr, Gannett & Co.,
Boston, Mass.

Guidebook Is Priceless

Keep up the good work. Be sure to have articles on new products and new chemicals. Your Guidebook is priceless and your monthly patent list very valuable.

WILLIAM J. SCHEPP,
Paterson, N. J.

CALENDAR OF EVENTS

American Petroleum Institute, 20th Annual Meeting, Stevens Hotel, Chicago, Nov. 13-17.

25-Year Club of the Petroleum Industry, First Annual Meeting and Dinner, Stevens Hotel, Chicago, Nov. 14.

American Management Association, Production Conference, Palmer House, Chicago, Nov. 15-16.

Purchasing Agents Association of Chicago, Products Exposition, Hotel Sherman, Chicago, Nov. 15-16.

American Institute of Chem. Eng., semi-annual meeting, Providence, R. I., Nov. 15-17.

American Society of Mech. Eng., Phila., Pa., Dec. 4-7. 17th Exposition of Chemical Industries, Grand Central Palace, N. Y. City, Dec. 4-9.

N. J. Oil Trades Association, annual meeting and banquet, Robert Treat Hotel, Newark, N. J., Dec. 7.

A. C. S., Eighth National Organic Chemistry Symposium, Div. of Organic Chem., St. Louis, Mo., Dec. 28-30.

Amer. Inst. of Min. & Met. Eng., N. Y. City, Feb. 12-15. 10th Annual Packaging Show, Hotel Astor, N. Y. City, March 26-29.

Amer. Ceramic Society, 42nd Annual Meeting, Royal York Hotel, Toronto, Canada, Apr. 7-12.

Local

A. C. S., N. Y. City Section, Joint Meeting with Society of Chemical Industry, American Section; S. C. I. Medal Presentation, N. Y. City, Nov. 10.

Congratulations, Dr. Romaine!

I wish to congratulate you upon the very fine article appearing in the current month's issue under the title of "Naval Stores 1919-1939," by Dr. Eldon Van Romaine, which I consider further evidence of the aggressiveness of chemical thought and activity in this country.

J. WRENCH, *Sales Manager,*
Industrial Chemical Sales Div.,
W. Va. Pulp & Paper Co.
N. Y. City.

Chute Western Congress Report

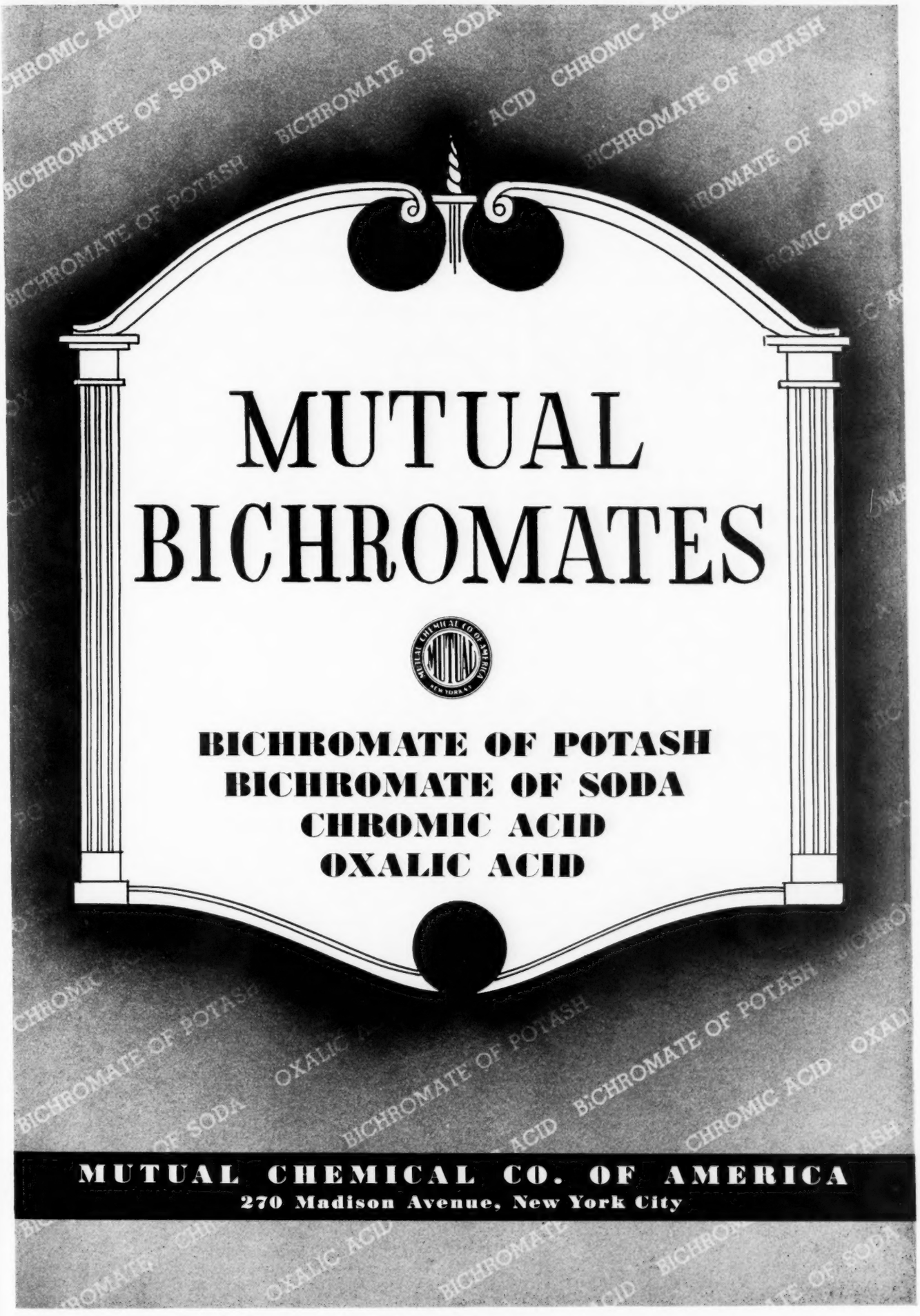
Reference is made to an article entitled "Western Chemists Evaluate Their Resources," by H. O. Chute, which was published in the September 1939 issue of your journal. In commenting on a paper entitled "Development and Objectives of the Four Regional Research Laboratories," which I presented before the Western Chemical Congress, Mr. Chute stated (page 314), "It appeared that the old Chemistry Division of the Agricultural Department, so long famous under Dr. Wiley, has been expanded into regional laboratories. They do not seem to know fully just what are their duties, but seem certain that they are to enforce the food and drug act in their respective regions. This will seemingly produce nine different interpretations of the Act when the nine Circuit Appeals Courts give decisions, which will multiply the present uncertainty and confusion."

There is an error in the above statement that I should like to bring to your attention. Neither the Western Regional Research Laboratory nor any of the other three similar Regional Laboratories will have any activities in connection with the enforcement of the Food and Drugs Act. Furthermore, at no time during the meeting Mr. Chute reported, were any remarks made that would indicate a connection of our work with that of the Food and Drug Administration, and I deeply regret that Mr. Chute received and published this erroneous impression.

ROY H. NAGEL,
Technical Assistant to the Director,
Western Regional Research Laboratory,
U. S. Dept. of Agriculture.
Berkeley, Calif.

I would like to call your attention to the article by H. O. Chute in the September issue, page 313. Apparently, this reporter of your selection is misinformed on agricultural chemistry, or unsympathetic to it, or willfully misleading. If he would take the trouble to read the calcination of phosphate papers in *Industrial & Engineering Chemistry* and would spend 35c for a copy of the Regional Laboratory Report to Congress he might change his views.

HONSDEN L. MARSHALL,
College Park, Md.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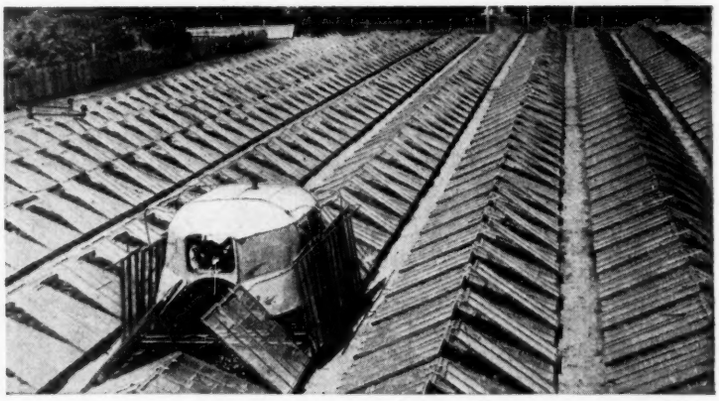
LIFE on the

(*Above*) **AN EGG IN THE HAND** boils faster than one in the saucepan when the cook holds it in the flame of a blowtorch—first taking the precaution of putting on fire-resisting gloves. Made by American Optical Company, the gloves are designed for workers exposed to heat or the risk of fire. Modern protective clothing brings top-to-toe safety to the worker in the chemical industry—guarding him against heat, cold, moisture, dangerous fumes, and acids or other corrosive chemicals.



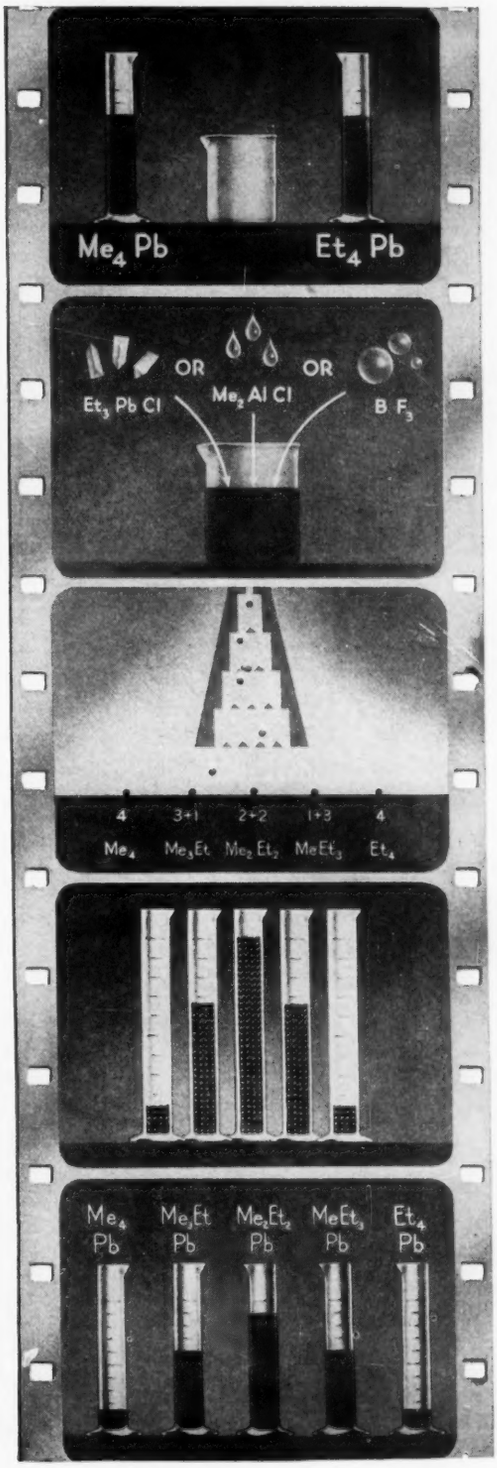
(*Above*) **MECHANIZING THE GREENHOUSE** is a new idea abroad, where tractors economically carry out many operations. Greenhouses are progressing steadily toward increased yield, and all over the world both mechanized and unmechanized ones recognize adequate insect and pest control as a vital problem. Cyanamid's CYANOGAS*G-FUMIGANT provides this control quickly and inexpensively—average cost is less than one cent per 1,000 cubic feet.

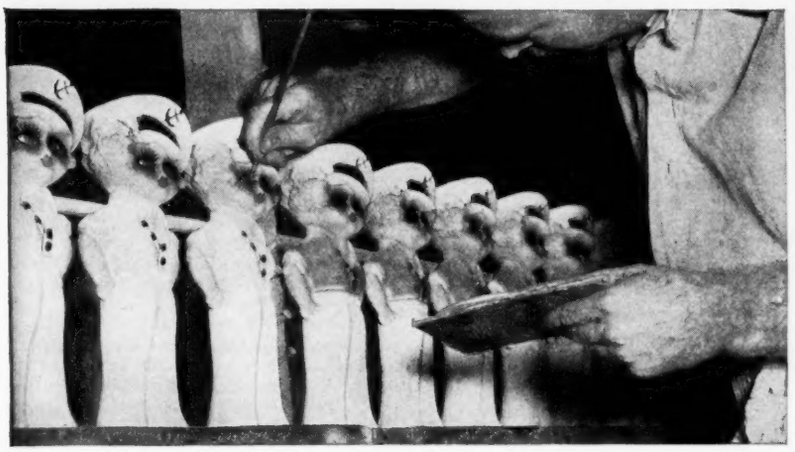
(*Below*) **VITAMINS TASTE BETTER** now that chemists have found ways of eliminating the fishy taste formerly associated with Vitamins A and D. Vi-Delta—product of Lederle Laboratories, Inc., Cyanamid subsidiary—is specially compounded to combine pleasant taste and high vitamin potency. In emulsion form it tastes like orange syrup—yet it surpasses minimum strength cod liver oil in Vitamins A and D potency.

(*Left*) **PLAYING WITH FIRE** is a favorite hobby of Mr. A. George Stern, who has developed "cold fire"—a liquid that burns with a vivid yellow flame. One of Mr. Stern's most spectacular demonstrations is to immerse both his hands in the liquid and then ignite it. Flames leap from his fingers without causing the slightest injury. Striking—but safe—theatrical effects are seen as an outstanding possibility of cold fire.

Chemical Newsfront

(*Right*) **LIKE A "CHEMICAL DICE GAME"** is the rearrangement reaction between two like compounds—with the law of probability accurately predicting the result. Upsetting the premise that like compounds will not react, Dr. George Calingaert, Ethyl Gasoline's Director of Chemical Research, has shown that such a reaction can be brought about by a suitable catalyst. In the first photo, tetraethyllead and tetramethyllead—of the same class—are normally inert in the presence of each other. Addition of a catalyst, as in the second photo, starts a random rearrangement of ethyl and methyl groups. When marbles are dropped on pegs, as in the third photo, the law of probability fixes the proportions in which they fall, and their chance distribution corresponds to the final regrouping of the ethyl and methyl radicals, as in the fourth photo. Besides the original compounds, three new ones are obtained, as in the fifth photo: trimethylethyllead, dimethyldiethyllead, and methyltriethyllead. It is forecast that this discovery will open up new channels of research. The photos are from a movie presented by Dr. Calingaert at the recent A. C. S. Convention in Boston.





(*Above*) **CHRISTMAS TOYS** are moving out onto store counters—and paint gives them their bright, cheery colors. Cyanamid supplies to the paint industry a comprehensive variety of products, and carries on continuously productive research in the industry's problems. In addition, Cyanamid offers the cooperation of a staff of specialists, to assist in the selection of materials for specific uses.

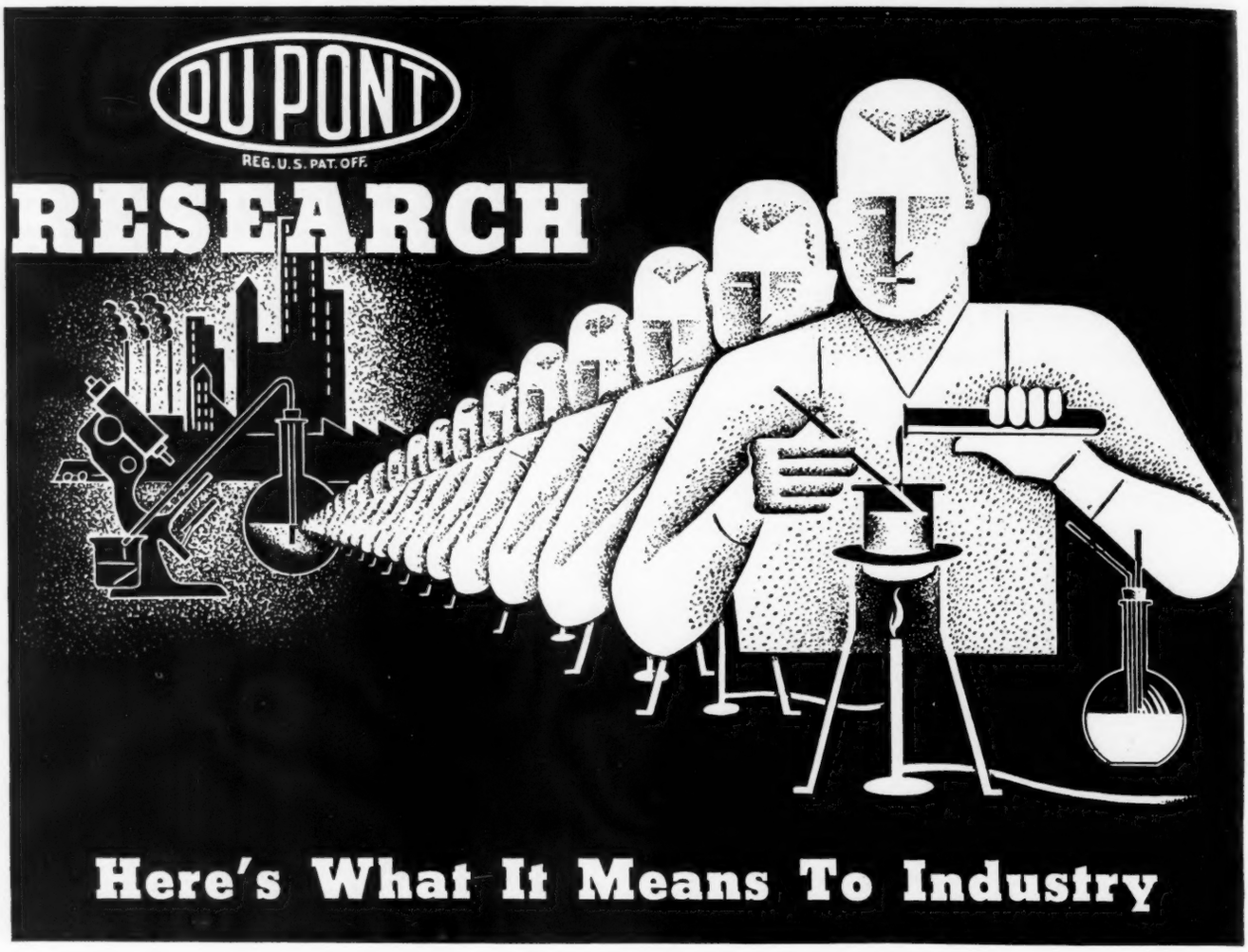
American Cyanamid & Chemical Corporation

CYANAMID PRODUCTS

30 ROCKEFELLER PLAZA, NEW YORK, N. Y.

*Registered U. S. Patent Office.

ADVERTISING PAGES REMOVED



AN outstanding characteristic of the du Pont Company is the emphasis on a large research organization, and this emphasis is not a recent development but one which has always been a policy. A large group of scientists is constantly at work, in good times and bad, developing new lines of products, improving products in the old lines, checking up and modernizing old processes and providing new ones.

Every branch of industry, and the ultimate consumer, too, benefits by this extensive research. The objective is chemicals and processes which are less expensive, better, more easily worked, which can help manufacturers to better profits, reduce costs, and improve their products. Better materials at lower costs enable manufacturers to develop and expand consumer markets, to make available to more people more of the better things for better living.

Du Pont research is carried on for industry in general. New products and new uses can't be picked out of the air. New industries don't "just happen." They are the result of planned research and development far in advance, a careful groundwork of today to create the things which may be required to meet the needs and conditions of one, five, ten and even twenty years later.

The answer to what du Pont research means to industry, rests with hundreds of improved products and processes now in use in a wide variety of industries; by the support which industry has given du Pont, thereby enabling it, not only to carry on, but to broaden its research activities with the years.

Let du Pont research and du Pont chemicals serve you in keeping ahead of the times . . . . . in broadening your markets. The R. & H. Technical staff will give you complete information and assistance in using the specialties listed here.

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CHEMICAL INDUSTRIES

The Chemical Business Magazine

Established 1914

A. E. Marshall, Monsanto electrical engineer, one of the authors in this issue, checks up on his company's equipment. See Symposium on Maintenance, beginning on page 553.

Nineteen-fourteen and Now

REMEMBERING the frantic experiences of the early war days twenty-five years ago is a favorite pastime of our oldsters nowadays. It is a more profitable occupation than reminiscences usually are, and it is fortunate that we have leaders whose experience is ground on the war foundation.

Consumers, too, remember the shortages and mounting prices of 1914 and they have hastened to market with a flood of covering orders. Their reasonable demands have all been supplied and prices have not skyrocketed, for profiting by war experience the chemical industry is unanimously resolved to keep the situation in hand.

With the best intentions in the world, however, this would not be possible had we not established the means of control and we should not overlook the great changes that make this possible. Today we are making in ton lots chemicals that were then commercially unknown. We have apparatus and control instruments undreamed of in 1914.

There have been as great, probably more important, changes in our human equipment. Then there was a dire shortage of competent technical men; today, we are well-staffed with experienced experts and have a generous—sometimes too generous—supply of well trained, younger chemists and engineers. We have even come to believe that the chemical salesman should be chemically trained and thus the old "peddler" has been largely replaced by the "service man." From a plant manager who was a "gang boss" has evolved a major executive who competently handles at once thermodynamics and applied psychology.

It is a grim coincidence that the twenty-fifth birthday of both the Chemical Exposition and "Chemical Industries" should be marked by the outbreak of another war in Europe. It is a great pity that so important milestones should be so dreadfully emphasized. Every exhibit in the Grand Central Palace and each page of our two Silver Anniversary numbers must impress upon us all how fundamental these changes have been within the past quarter century.

The Exposition—A National Institution

HOW the idea of a Chemical Exposition developed gradually out of the work of several younger members of the Chemists' Club in New York who were assisting Dr. William M. Grosvenor in the Club's library in 1914, is a story too well known to warrant repetition.

Charles F. Roth

Manager

The Exposition of Chemical Industries

No wonder that the Grosvenor "boys" were besieged at the outbreak of the World War with requests from chemical manufacturers as to where this or that type of equipment might be had, and on the other hand, from chemical consumers about possible domestic sources of products formerly purchased abroad.

No one can estimate the psychological value of The First Chemical Exposition. From this springboard, American chemical equipment manufacturers and American chemical producers proceeded to develop a round, self-contained American chemical industry.

Subsequent Expositions served to point out to industrialists the natural resources of the South and the chemical manufacturing possibilities of that area; they aided materially in overcoming initial prejudices of the banker towards the chemical industry; and by educating the layman to the true worth of the industry in the life of this nation they helped to make available capital for research and expansion.

The Exposition always has been a great deal more than merely a display of equipment and chemicals. Within its aisles, many noteworthy advances have been conceived, and alert men seek here new ideas, as well as new equipment and products.

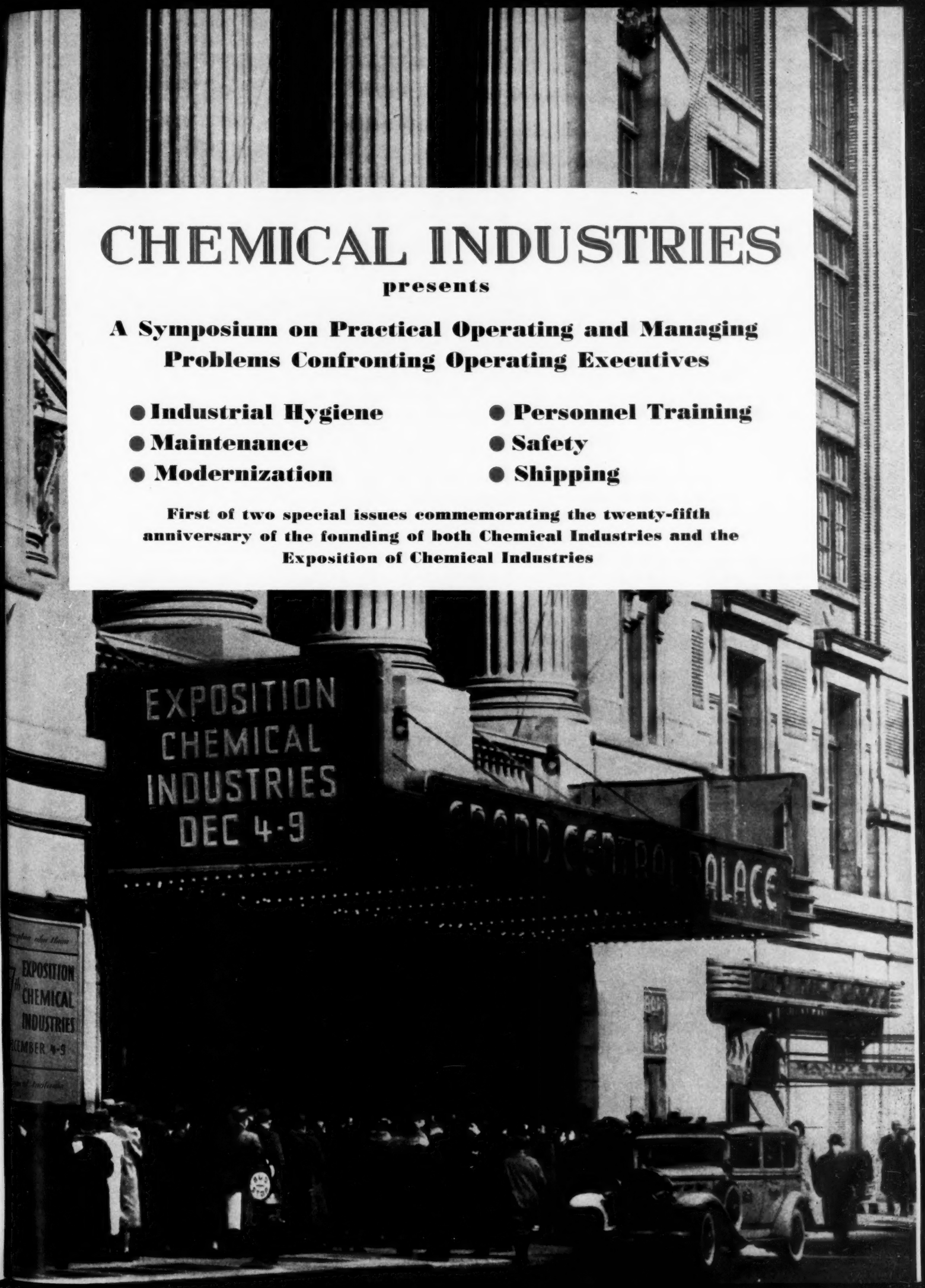
Be on the lookout at this show for stimulating new equipment. There will be more than an average display of real innovations. Several new types of centrifugals, a mixing machine applying a new principle of agitation, a new control for the electric furnace, a solid porcelain vacuum filter and a new high vacuum pump, an application of automatic operation to a compression packer, a laboratory tray drier that weighs and records as the product dries—these and others are to be on display.

In the field of "New Chemicals for Industry" our own booth will exhibit several new synthetic waxes, samples of the much-talked-of and eagerly awaited nitroparaffins, new hydrogenated coal tar solvents, half a dozen new wetting agents, a whole collection of new food colors, many new dyes, sweet potato starch—and over three hundred other chemicals developed since the last Exposition, each labelled with its specifications and uses.

Here are the pledges for the future. No institution survives to celebrate a silver anniversary unless it continues to serve some specific need. The Exposition of Chemical Industries has attained an unique position as a biennial inventory of chemical advances. As the years go on, these advances become accumulative, hence more difficult to view and assimilate, unless conveniently brought together in one place. Serving such a vital need, is the Exposition's function.

Walter J. Murphy

Managing Editor.



CHEMICAL INDUSTRIES

presents

A Symposium on Practical Operating and Managing Problems Confronting Operating Executives

- **Industrial Hygiene**
- **Maintenance**
- **Modernization**
- **Personnel Training**
- **Safety**
- **Shipping**

First of two special issues commemorating the twenty-fifth anniversary of the founding of both Chemical Industries and the Exposition of Chemical Industries

How Shall We Obtain Executives *for the* Chemical Industry?

By Walter S. Landis, Ph.D.
Vice-President, American Cyanamid Company

VOLUMES have been written on the general subject of the selection and training of employees, many of them quite worth while; much of the material seems to me to be too general and too difficult of application.

An executive may be defined for our purposes as anyone empowered to determine policy, program and method. His activities are restricted by corporate, civil and criminal law, by charter and by-laws, by limitations of delegation. He is in no sense a free agent. In its broadest interpretation it includes a large group ranging from straw-boss to chairman of board. The work essentially is directive in character and affects production of subordinates.

The executive primarily deals with people—you and I, and a lot more. First and foremost is the general public. They are the customers for his products. He must know their mass psychology—what they want and what they are going to demand. He must know the limitations of his institution—a matter of financiers, of engineers, of operators, of raw material suppliers. Then comes the Government, the legislators, the administrators, the lawyers, the taxation units with their multitude of employees, few of which have any real knowledge of production and distribution. He deals with the problem of employees, of labor, of organization, of wages and hours and social security. I could continue this almost indefinitely, but it always comes down to a problem of solving the equation of his fellowmen, knowing all the while that the mathematical treatment of the function of emotion is not very highly developed.

The first problem in the development of an executive in the chemical industry is the choice of the raw material. I am not one of those who believes that intensive training in chemistry is the necessary foundation for the development of a chemical executive. As a matter of fact, while certain executive positions might well be filled by a suitable personality equipped with such education, it would be a rare occurrence if such would prove outstandingly satisfactory in general executive work.

Samuel Vauclain once defined an engineer as a person who could apply horse-sense to overcoming the obstacles of nature. In recent years industry has been driven into such a maze of political entanglement that only horse-sense enables the executive to keep on his feet. Primarily, therefore, if I were to choose the material out of which to create executives from general grouping by education, I should turn very largely to the engineering profession. Somehow or other our engineering colleges develop a mental discipline and a broadened viewpoint not possessed as yet by any other of our divisions of training. I have great hopes that the schools of business administration which have been developed in some of our engineering schools if they do not depart too far from the classical engineering training, will provide an even better educational background. But they are on trial and it will be some years yet before we can properly appraise the product. To repeat, I commend to them that they should go as far as possible through the general engineering subjects but broadening into the more allied management problems even at the expense of a lengthening of the course of instruction. Competition, in my opinion, is driving hard to a six year course. We are more receptive to the doctor for our chemical man-power and we should command at least equality when we come to the future boss of our chemists.

The great unknown problem is the selection of the raw material for this training. There are innumerable prescriptions and it is not easy to appraise them. I admit frankly that I cannot guarantee one hundred per cent. results from any one of them. I believe that the only way to select our training material will be to live with them for some considerable time before they are employed. This, however, is not possible in all cases. We, therefore, must rely upon the judgment of those who have had contact, that is the teachers in the preparatory schools, and the professors in the institutions of higher education. I place a great deal of dependence upon their reports but I want those reports delivered personally and not through the mails.

Assuming, however, that we have used the methods of appraisal that are available and finally have selected some more or less likely candidates, I then advise that they be sent to one of the plants for at least six months where they shall be assigned as helpers to one of the crews that service the widest portions of the plants. These may be electricians, pipe fitters, mill-wrights, or what you call them. It is not that I expect to add any valuable training to my employee but I want to find out in the quickest possible time if he can mix well with his fellow men. As mentioned above his future con-

tacts are going to be with his fellows and it is well to find out as soon as possible if his temperament clashes, and I know of no better place or method than the above. If he considers the work beneath his dignity he has no place in an executive position. If he cannot get along with the every day employee he will be of no great future use and he should be transferred immediately to a division of activity that does not require this personal contact on the broader scale. After six months at this service then he is ready for promotion and in my case it would be to some service department.

Work in Sales Service

Assuming that at this stage we have some better idea of the possibility of our raw material we now face the problem of acquainting him with the general business of this company. This problem presents itself irrespective of the division of activity into which he ultimately moves. I consider it advisable that all members in executive positions of importance should be familiar with the products of the institution. I know of no place where this can be learned better than through contact with the problems presented by the customer. In the larger chemical companies there is a division of trained service men and provided with facilities for dealing with market and customer problems. From six to twelve months should be spent in this division the time being governed by the ultimate direction in which the candidate should advance. Men destined for operating work need spend only six months and for sales work can well spend a full year.

Following this period of training all should then come into the general office where their time should be divided among order and billing, credit, general accountancy, and if operating or engineering is the ultimate objective, they should shorten this period in order that they may be assigned to the engineering department for some period of familiarizing themselves, at least with the machinery of such division.

We have thus covered a two year training period. Within the first six to twelve months we should have been able to distinguish those characteristics in our candidate that should determine the direction he is best fitted to go, or he should be eliminated, if unqualified, from this training course, or even from the institution. It is wrong fundamentally both from the institution and from the individual standpoint to carry a man after it is decided that he has mediocre qualifications. The problem child should be eliminated early, assigned to ordinary operating work or some other division of more or less routine. There will always be certain complete losses and these should go out in due fairness to both parties.

Where Physique Counts

In the selection of raw material I believe that for operating and engineering work men of good physique should be picked. I am not speaking of general health as much as of height and weight. I always have favored the big man for the operating job even at the sacrifice of scholarship or general intelligence. Fortunately it is not so difficult to combine both in the same individual. I do not consider physique so important for other executive activities.

The most serious problem, however, after the selection of material is the organization and direction of this training so that the candidates are not lost on the way. In the first place it must be understood throughout the entire organization that these men in training are entitled to first choice in the filling of new positions insofar as these positions can be serviced by this character of individual. I suppose I am somewhat of the old school in believing that the office boy or his technical equivalent is the first position open and that all subsequent places are filled by promotion from within the organization. We all know this cannot be carried out literally because accidents create places which must be filled with experienced men. I do not like to lose my own personnel and therefore, do not steal from others. I think that the greatest incentive to the youngster is to have him understand that if he makes good his future is always the place above him. All this is much more easily said than practiced and it is really a difficult task in a large organization to enforce this rule.

Close Supervision Vital

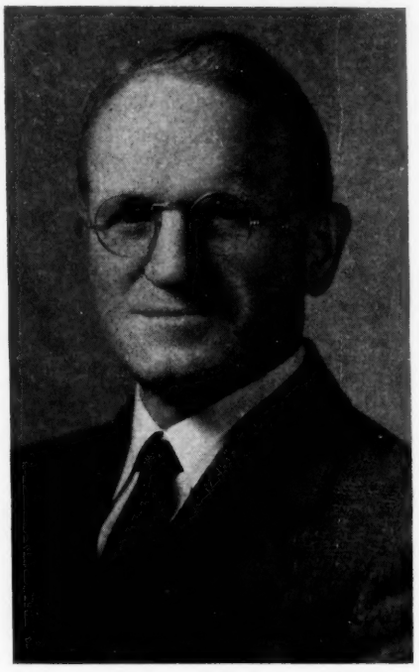
It is very necessary that close supervision be given to this training. These men must be moved on schedule and a farsighted program must be developed comprehensive enough to follow through from first employment to transfer to the regular departments. Heads of departments must anticipate their needs from one to two years in advance and must so organize their units that these places are open as these men qualify and that qualification is based very largely on the calendar. We have at least four or five divisions of the company concerned and must within a year after taking on the student have some indication of the direction he is best suited to move, so that his second year's training, to some extent, follows this line of future. Years ago this was not an impossibility but, in the general disturbance of business within the last decade, planning of this nature is an extremely difficult, if not an almost impossible problem. It is only by the very closest cooperation of the director of the school with the heads of the several corporate divisions that even moderate success in this direction is the result. This should be made clear to the youngster coming into the school and if he is of the right material he will appreciate the difficulties of direction. I can also state in my own experience, that a good executive is always cooperative in this work and one can obtain a surprisingly workable program covering up to a year outlining in fair detail the future needs of the division with a considerable degree of accuracy as to timing.

One last thought which has proven of material value is to carry these men during their apprenticeship, that is for two years, on an administrative or special payroll. They are assigned to the various jobs and not charged directly to the division in which they are working. Psychologically this has an excellent effect in that it looks like free service to the division head and he is a lot more cooperative and helpful in spite of the fact that ultimately we all know that there is only a single source of all payrolls. Nevertheless, it is surprising what beneficial effect this has on the general problem. It, however, places a burden on the director of the school to see that these men are not kept in a single routine job merely because they happen to be available at no charge to the corporate unit.

The Modern Executive

The days of the comic strip executive with a clean desk save for a battery of push buttons and a flock of telephones, is passing rapidly. The extremely varied character of the problems he must face in these modern days when a new deal of rules, regulations, and precepts are dealt with each round of the clock, requires a fundamental knowledge, an agile mentality and a cooperative attack that can be met only by comprehensive and thorough selection and training. As long as we are permitted to live in a competitive atmosphere we must recognize the struggle for perfection. The chemical industry possesses an age that is the envy of all other activity. It long was built upon the knowledge, skill and personality of outstanding figures. Sometime review the names borne by chemical companies the world over and then look into their history. We, therefore, have to build up the successors to these pioneers and leave behind us the same position that we inherited. We have to train men for executive positions and not leave it to chance.

Economics of Health In Chemical Industries



By Emery R. Hayhurst, M.D., Ph.D.
Consulting Industrial Hygienist, Columbus, Ohio, Member Permanent International Committee on Occupational Diseases

THE effects of chemicals upon health have been the subject of scientific inquiry at least as far back as Georg Agricola in Silesia, physician and mineralogist, who, as early as 1550, described his observations upon the dangers of mineral dust upon the lungs. Apparently the first book on lead disease was published by Samuel Stockhausen in Goslar, in 1556. Bernardini Ramazzini, "the Father of Industrial Medicine," published his "Diseases of Tradesmen" (in Latin), the first 40 chapters in 1700, and the 12 supplementary chapters in 1713—a work early translated into most leading languages. Professor C. T. Thackrah of London, in his "Essay on the Effects of the Principal Arts, Trades, and Professions on Health and Longevity" (London), 1832, emphasized industrial poisons, and first separated "brass chills" from malaria.

Today, new materials and new methods of manufacture often occasion new types of occupational diseases or revive old ones. Hence we are impressed that safe as well as highly scientific methods of production, conversion, processing and ultimate customer-use become essential.

A poison is any substance which by its chemical action in the tissues of the body produces marked functional disturbances or destructive changes (see further discussion in the author's article on "Occupational Diseases in Chemical Processes," in *The Merck Report*, 48,2:4-10 (April) 1939).

Even the ingestion of water under conditions which exist daily in certain processes is attended by serious symptoms of illness, e.g., workmen exposed to high temperatures which induce excessive sweating, lassitude and even severe colic and muscular cramps following the ingestion of water—a condition now recognized as associated with depletion of chlorides, and quite amenable to increased sodium chloride intake.

To the lay mind skin irritants are poisons, as well as allergic substances and even obnoxious odors when they make him sick. Experience shows that man adjusts himself, usually promptly, to wide variations in physical environment, less adequately to biological factors, but with the greatest difficulty, if at all, to chemical exposures, at least beyond medicinal doses.

With most poisons the daily period of exposure may be a decisive factor in poisoning: thus, overtime work may precipitate poisoning in a group which otherwise successfully negotiates the usual amount of daily poison intake.

In legal procedure, exposure up to a few hours' time constitutes an "accident," as a rule, while an exposure interrupted by work shifts means a "disease," but there is no accepted line of demarcation.

The compensation acts, established extensively in various states since 1911, have in themselves stimulated great interest in the medical and legal aspects of this subject, and proven an important indirect control measure, obviously because of the financial burden which compensation imposes.

Vital Statistics

Some features do not yield to present-day statistical inclusions such as inefficiency due to industrial poisoning where the employe does not leave his job. Even the fact that he may be poisoned may escape recognition because the effects of poisonings are often very illusive. Certain data on health status and death rates are, however, at hand.

In the Public Health Service's "Health Study of Ten Thousand Male Industrial Workers" (P. H. Bull. No. 162, 170 pp., 1926), ten industries were investigated: Pottery, post office, glass, gas, foundry, steel, chemical, cement, cigar, and garment. It was found that those employed in chemical procedures (916 men) had the highest rates found in any of the ten industries for flat feet without symptoms (45%) and for hernia (32%), and stood second highest for varicose veins (11%); that, per 100 male workers, impaired hearing was present in 18, other ear defects in 8; inflamed eyes in 4; pyorrhea in 42, missing teeth in 42, defective teeth in 40; hemorrhoids in 10; skin eruptions in 10; chronic diseases of the naso-pharynx in 86, enlarged tonsils in 16, bronchitis in 7, and tuberculosis in 1. Respiratory diseases were found to be high, especially in the manufacture of acids, sulfates, chromates, etc. Also, that in no other industry was the average length of service so short. Heart defects stood out as showing an increase with length of service, and rose more rapidly with age in this industry than in any of the ten investigated.

In England and Wales, in the last Registrar-General's Report on Occupational Mortality, published in 1938, and applying to the three years 1930-1932, it was found that 37,024 *males* in the total group comprising chemical processes, makers of paints, oils, etc., had a mortality ratio of 80 as compared to 100 for the calculated standard for all male workers, aged 20-65. For 21,002 skilled workers in chemical processes (exclusive of makers of paints and oils), the ratio was 66. For this group, under specific causes of death, none of the 24 afflictions tabulated

exceeded the calculated standard mortality ratio except accidents, 156. Cancer (all sites) rated 92, diseases of the respiratory system 64, respiratory tuberculosis 61, pneumonia 61, and diseases of the heart 43. There were 56 deaths from cancer compared with 61 standard deaths, but among the special group of tar and wood-distillers there were 8 cancer deaths compared with about 4 calculated. "Workers engaged in the manufacture of dyes, and in other manufacture" had "low general mortalities, while makers of paints and oils gave ratios of above 100." "Makers of paint, oil, soap, and grease showed a slight excess of mortality, accounted for by heart disease for which the standard mortality ratio of 140 was excessive to a probably significant degree," while "cerebral hemorrhage also registered 17 compared with 12 standard deaths." As a group, however, male chemical workers stood third best in 86 occupations, and seventh best in 200 occupations. For heart diseases, digestive diseases and nephritis their mortality was the lowest in 86 occupations. For 2,401 *single women* similarly engaged in the chemical group as a whole, the mortality ratio was 129 as compared to the standard 100. For 2,290 single women in chemical processes including paint makers, the ratio was 115. (Distribution by specific causes of death is not given for women employes.)

In a report upon injury frequency rates and employment indexes for 29 manufacturing industries, 1929-35, Max D. Kossoris (Industrial Injuries and the Business Cycle, Monthly Labor Review, March, 1938) found the trend in the correlation between the two to be very close. The same author with Swen Kjaer (Industrial Injuries in the United States During 1937, Monthly Labor Review, March, 1939) reports that in 1409 chemical products establishments (1937) having 239,000 employes who were employed 476 million hours, the total deaths were 76, permanent total disabilities 3, permanent partial disabilities 535, temporary total disabilities 5,725, and the total time lost 1,189,149 days. The frequency rate was 13.70 vs. 17.82 for total manufacturing industries, and the severity rate 2.58 vs. 2.31, respectively. Of seven specified classifications of chemical manufacturing (druggists preparations, explosives, fertilizers, paints and varnishes, rayon and allied products, and soap), only fertilizers stood out unfavorably in frequency rate (41.59) and severity rate (5.81). A similar status prevailed in 1936. In 1937, the average days lost per worker in chemical products as a whole was 1,121 for permanent partial disability and 22 for temporary total disability, both somewhat in excess of similar figures for total manufacturing—1,006 and 20, respectively. The various divisions of chemical products showed considerable differences, e.g., fertilizers, paints and varnishes showed excessive days lost due to permanent partial disability; and explosives and petroleum refining, for temporary total disability.

***BORN** in St. Louis in 1880, Doctor Hayhurst graduated in medicine at the University of Illinois in 1908 and received his Ph.D. from the University of Chicago in 1916, in the meantime completing a residence interneship at Cook County Hospital, Chicago. His experience in industrial, educational, and official capacities has been extensive. No doubt, as intimately related to his choice of a career, was his work during most of the summers from 1894 to 1905 in the parent plant of the American Can Company at Maywood, Illinois—first as a factory hand and later in various department offices where first aid work was a feature. As a physician he early turned to industrial health pursuits, being with the Illinois commission on occupational diseases in 1910 and chief of the Ohio State survey of occupational diseases, 1913-15, after which he was consultant and special investigator in the subject for the Ohio Department of Health to 1937. During the War he was secretary of the committee on factory sanitation of the Council of National Defense as well as a professor in the School for Military Aeronautics. His career includes teaching and research at Illinois, Chicago, and Ohio State Universities, at the latter of which he was professor of hygiene and departmental chairman for many years. He has also pursued his studies in Europe and North American countries. He is the author of several books and many papers, chiefly in the field of industrial hygiene, and belongs to a number of well-known professional and scientific associations.*

Some of the Specific Hazards

Probably the oldest poison in human experience is carbon monoxide whose effects had their beginning in prehistoric ages when man first began to use fire. It is still a feature, usually of accidental nature, in many industrial processes but not as prominent as in domestic life.

By all odds, the commonest occupational disease in the chemical field is dermatitis, the control of which demands not only engineering and chemical procedures but the prior and periodical examination of workers to insure a less susceptible group—a question which extends even to race and complexion. Thus the negro and the dark-skinned are, as a rule, less susceptible to skin irritants. Further, the selection of a group of workers not suffering from various constitutional states and organic diseases is necessary. Following this, specific protective applications (lotions, ointments, soaps, etc.) have been evolved for those whose skin is exposed to a long list of malefic influences.

Henry Field Smyth ("Health Hazards in Chemical Industries," *The Chemist*, Vol. XVI, No. 4:187-194, April, 1939) emphasizes that the chemical state is of importance, that is, toxic substances may act in one of three forms: 1. As direct tissue poisons, circulating and producing harm as such (methyl alcohol, hydrocyanic acid, cyanates, hydrogen sulfide); 2. through intermediate products, when not fully oxidized (quinones from phenylenediamine); or 3. through harmful end-products (nascent hydrochloric acid from phosgene gas in contact with moist body tissues). The degrees of toxic action may be acute, sub-acute, chronic or cumulative—in the last perhaps unrecognized (e.g., lead, benzol, radium) until the worker has transferred to another unrelated industry.

The ingestion of alcohol considerably aggravates the effects of certain poisons such as dinitrophenol, cyanamide and carbon tetrachloride. Again, poisoned workers readily take to alcohol as a surcease and in certain industries (e.g. brass founding) its use to "prevent" poisoning is traditional, by which "industrial alcoholism" is recognized.

For over 25 years lead poisoning usually headed the list of constitutional poisonings in the physician's reports made to the Ohio Department of Health. It was thought a decade ago that lead poisoning was gradually disappearing as a special hazard in industry, based upon statistics of death and reported lead poisoned cases, yet it suddenly appeared again in the automobile industry when some 4000 cases bloomed out in the Detroit area in connection with lead-alloy filling of depressions in automobile bodies and appurtenances. Several factors were responsible—the use of power grinders, overheating of the lead alloy, and failure to provide adequate ventilation, personal protection, and medical supervision. However, it was rather promptly brought under complete control.

Tetraethyl Lead

An example of complete control of a highly dangerous substance is seen in the manufacture of tetraethyl lead where, during its placement on a commercial basis and even early in the days of its manufacture many cases of illness and a few fatalities occurred. This was all eliminated through the adoption of entirely safe processes. In the early days it seemed doubtful whether this very toxic product could be handled and whether its future manufacture should not be abandoned because of this toxic property, but chemists solved the problem. Among substances with delayed action is hydrogen sulfide in small doses. The butyl radical introduces a toxic property especially in aliphatic hydrocarbons while the methyl radical needs only to be mentioned in the

form of methyl alcohol. While most inhaled benzene is eliminated through the lungs, perhaps one quarter is oxidized in the body to phenol and dihydroxybenzenes which combine with sulfuric and glycuronic acids to be eliminated in the urine.

Certain aniline substances, e.g., paratoluidine are suspected of being the cause of bladder cancer in workers but the meta compounds are more poisonous. Dinitrophenol illustrates a condition where women, for some reason, are less affected by exposure than men, which is unusual. Cancer-producing substances occur in tar, pitch, and paraffin while petroleum lubricating oils are associated with a rather marked amount of so-called "mule-spinner's" cancer in the textile works of England (oil-splashed clothing), something which is most uncommon in this country, possibly because of different methods of treating the oils before admitting them to commerce in the two countries.

Handling of Dyes

The dyestuffs set another example for numerous irritants and poisons for which improved methods of manufacture, together with precautions in handling have practically eliminated the dangers.

The chromium salts and acids are very common chemical offenders, producing both skin and nasal irritation and ulcers. Methods have now been perfected by which properly applied exhausts, over or along the edges of tanks, are a practically complete answer to the hazard.

In the manufacture of nitrocellulose, present-day methods have mitigated the highly dangerous processes which formerly cost the lives of many employes and caused painful injuries and, often, prolonged illnesses in others. A small plant might have from 50 to 75 nitrocotton fires within a few hours' time whereas today such a fire is a rarity and a case of nitrous fume poisoning is almost unheard of. Nitrous fumes are among the most insidious in industry since they are respirable and symptoms of eventually fatal illness may not come on for several hours. Death results from pulmonary edema. In fact, we are dealing with one of the war gases here.

Handling of substances, such as lacquer finishes, may require dangerous diluents or vehicles to be added to otherwise harmless basic substances so that special precautions must be developed where vapors, mists, or spray particles may arise.

Probably nowhere has more success been reached in the safe manufacture of dangerous chemical products than in the explosives industry, where poisons, such as nitroglycerin, trinitrotoluol, fulminated mercury, and tetryl are handled with a minimum of untoward effects.

Regarding massive quantities of dust where immediate poisoning is no factor, such as silica and many other mineral and organic dusts, it is a pretty good rule not to expect the human body to tolerate much more than customarily occurs in nature and especially so where experience has shown that occupational diseases have occurred. In short, the amount of dust in itself may be a definite hazard. Dusts very often produce more or less upper respiratory afflictions or low-grade bronchitis whose complications are often just as much to be feared as the chronic effects.

Chemists and laboratory workers themselves are too frequently poisoned as experience shows, for example, in handling mercury, benzol, chlorinated hydrocarbons, radium, hydrogen sulfide, petroleum distillates, etc.

Other Difficulties

The strides made in the development and conduct of industry have more than kept pace with the problem of safety for the worker. Had they kept apace, there would be relatively few accidents or occupational diseases. In truth, the incidence of disease is often far more reaching than appears on the surface.

One chief reason for pre-employment examinations is to learn what a given applicant's "normal" condition is "when he is all right." For example, the physician finds wide limits of normality and power of adjustment—some are getting along within narrow boundaries of health while others are tolerant of quite wide stresses and strains. This ability of "staying put" has been called "homeostasis" by the physiologist, Dr. Walter B. Cannon. Familiarity too often breeds carelessness if not bravado so that a constant check on this tendency has to be maintained.

The Problem of Solvents

One cannot help but feel how foolish it is to first poison a breathing atmosphere and then go to the expense of trying to purify it by various means, when confinement against escape in the first place would solve the whole problem. On the other hand there are certain processes, as those utilizing benzol in the textile leather industry, where it has been almost impossible for mechanical engineering to prevent poisoning so that the use of the poisonous substance has had to be abandoned. Misuse of chemical substances is not at all uncommon in domestic life as, for example, the housewife who uses an insecticide sprayer to apply lacquer to furniture, so that precautionary notices should appear on all poison-containing compounds against their improper use. Occasionally, mechanizing the application of chemical products has brought about obstructive tactics on the part of workmen and false claims of poisonings, as the substituting of the spray for the hand method. This is an economic question which is not peculiar to the chemical field and its solution lies in directions outside of the scope of this paper.

The objection of organized labor to physical examinations, based essentially upon the likely expense attendant, the possible misuse of such examinations for getting rid of certain employes, and the question of what is to become of those "cast upon the scrap heap," is gradually disappearing as remedies for these have been found, so that recently a large automobile union has adopted a model health clause for its union contracts with employers which provides, among other features, that workers shall have complete physical and laboratory examinations as well as supervised medical and surgical aid.

Some states compensate only for a certain schedule of occupational diseases but the courts have been playing havoc with this construction in recent years so that it well behooves a management to guard against all legal possibilities, especially those involving hazards which might constitute contributory negligence.

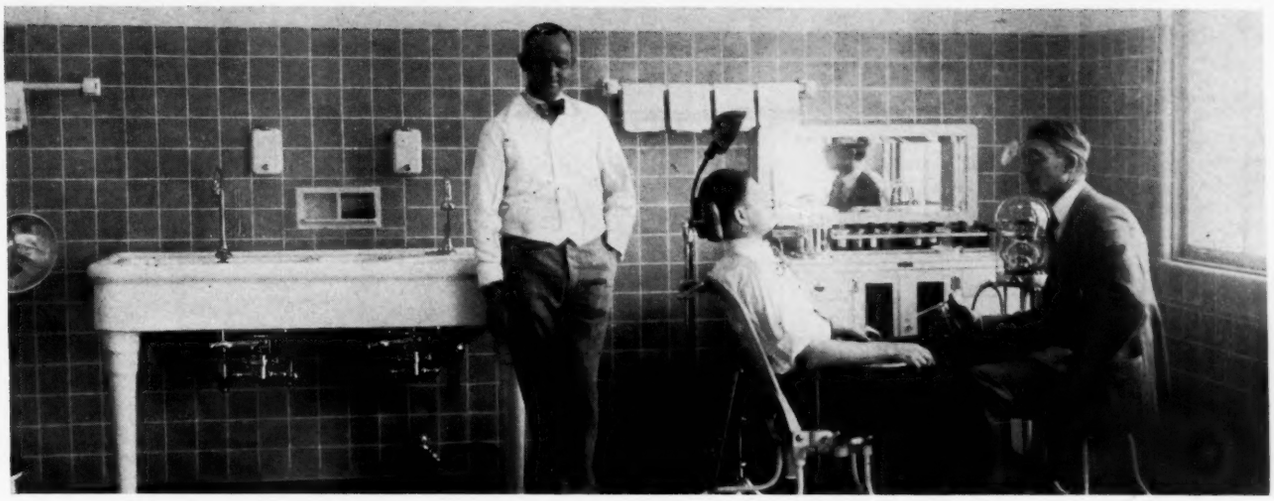
Some Wholesome Precautionary Measures

It seems a safe maxim to state that no matter how toxic or dangerous a product may be, it can be safely produced, elaborated, processed and handled, with proper equipment and a well-trained organization. The intelligence of workers plays an important part in their protection, as well as educational methods used. Illiterate, uninstructable, and otherwise ignorant workers are decided hazards in themselves so that the hiring of a better class of men may be quite worthwhile.

The importance of the medical aspects of new products while they are in the experimental stage continues to need emphasis, and experience shows this is true until they are well established on a commercial basis of production.

Protection of men entering atmospheres containing various poisonous gases requires the presence of gas masks and hose masks and, where heavy gases or vapors may replace the breathing atmosphere, as in lower strata, oxygen breathing apparatus should be at hand. Occasionally substances such as aniline, carbon bisulfide, the cyanides, and tetraethyl lead, are absorbed through the skin which may be a more important portal of entry than the nose or mouth, whereby special protection for the skin becomes essential.

It seems almost unnecessary to point out that ordinary dust and spray masks are of little protection against volatile substances and, in fact, may increase the period of poisonous inhalation because of the evaporation of particles lodged in the filtering fabric or other medium. Here, consideration must be given to supplied-air masks, helmets, or cannister masks devised for the poisons concerned.



Periodic employe health "check-ups" are desirable, particularly where special hazards exist

Mechanical enclosure, exhaust ventilation, or extensive room ventilation, and in many situations, protection of the worker by personal appliances are the chief essentials from the engineering-safety point of view to which the part played by the plant physician is complementary as a check that all is proceeding satisfactorily. Where local exhausts fail to protect against poisonous substances in the air, voluminous ventilation may be effective. On the other hand, a breeze from an open window may disrupt the proper functioning of a well-designed local exhaust system and so jeopardize the health of workers in the vicinity. Thus the summer season may become the season of poisoning. Furthermore, the regular inspection of all apparatus, particularly that enhousing or conveying gaseous or dusty products, is a necessary routine in the prevention of poisoning and may be more important in the long run than inspection for mechanical adequacy

There should be close cooperation between management and governmental auspices as well as research foundations in regard to industrial health. This refers to the mutual interchange of information and the prompt reporting of occupational diseases, not only for the immediate solution of problems, but for accumulating valuable data for prevention purposes, while at the same time shielding the identity of individual plants and persons. In this connection, managements might well take a direct interest in seeing that there is a wise administration of the law and that competent persons are installed in public offices having to do with industrial hygiene and the prevention of occupational diseases.

List Poisonous Substances

In the last two or three years the U. S. Public Health Service has promoted the laudable idea of listing all the poisonous substances purchased or developed in the plant, and considering them all as potential hazards, from which a basis is formed for engineering and medical procedures to prevent mishap.

The frequency of medical examinations of exposed workers necessarily depends upon the type of poison concerned. This is something to be left to the judgment of the physician. Some workers, as those exposed to tetraethyl lead, may require a sample blood test weekly; others, as in benzene exposure, monthly, and others in varying periods. In addition, the physician soon learns to recognize important personal predisposing elements and should be given a free hand in deciding how often a given worker should be called before him for a check-up. Cooperation should be had with medical colleges, as the present curriculum in most medical colleges is short on essential and practical information in regard to industrial health in general, a field which involves such a large percentage of the time of general practitioners and specialists.

Try Use of Substitutes

Because of the toxic or irritating properties of numerous chemicals, it is often advisable to adopt substitutes. For example, titanium oxide, zinc oxide, lithopone, etc., to circumvent lead poisoning; or the use of higher homologues for benzene; or of petroleum distillates of higher boiling points. Most halogenated hydrocarbons are poisonous, hence their otherwise logical use as substitutes must be carefully considered.

Reference is here made to the bulletin on "Heavy Chemical Manufacturing" published as one of its Industrial Reports by the Retail Credit Company, Atlanta, Georgia (Vol. IX, No. 4:35-44, April, 1934). In particular, attention is called to methods used by one large chemical company operating in this country and abroad, which enabled it to establish the best national safety record for plants engaged in the manufacture of heavy and intermediate chemicals during the years 1930 and 1931, as well as to establish a "no-loss time record" over a period of one year and 207 days, involving 1,461,156 man-hours.

The principles laid down by the Manufacturing Chemists Association governing safe-handling of chemicals include: (1) Symbols—skull and crossbones. (2) Poison labels. (3) Use of warning colors, obnoxious odor and taste substances. (4) Special agencies, such as powerful biting-substances, emetics. Precautions in dispensing broken packages or the prohibition of sales of such. (5) Informative and precautionary measures and instructions—peculiar shapes of containers and/or substances. Labels, such as "Use in a well-ventilated place." Instructions upon how to open and handle containers. Steps to be taken in case poisoning occurs.

Further Information and Conclusion

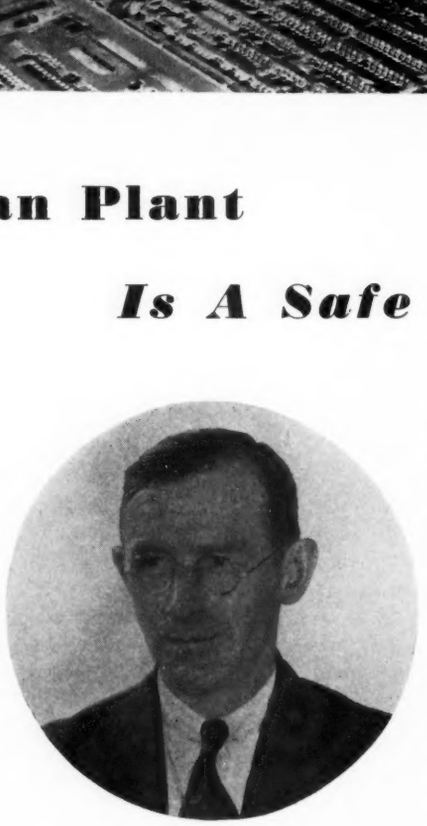
A considerable literature has accumulated in the general field of industrial health-official, private research and special. Even the annual list of textbooks alone, published by the American Public Health Association, New York City—a list going back only to 1935—will carry nearly fifty titles this year under "Industrial Hygiene." A summary for prophylaxis against many industrial poisons and groups of poisons is included in the author's article on "The Intoxications," in "The Practitioners' Library of Medicine and Surgery" (Vol. 12—Hygiene: 649-682, 1937, D. Appleton-Century Company, Inc.).

In closing, we may remark that after a process is rendered "fool-proof" it usually costs next to nothing to maintain it so, while, at the same time, occupational diseases, compensation cases and lawsuits should fade out of the picture.

Airplane view of the huge Calco Chemical plant at Bound Brook, N. J., truly a tremendous "housekeeping problem"

A Clean Plant

Is A Safe Plant



By George C. McCarten

Chemical Engineer

Calco Chemical Company

A GOOD safety record in a chemical plant is earned day by day. Lucky breaks may permit a shop to escape accidents for some time; but eventually the law of chance is bound to offset the effect of lucky breaks. I am convinced that a shop obtains the kind of safety record it is entitled to on the basis of its efforts.

Most of the accidents in a chemical plant occur when the orderly process routine is disturbed. After the routine is upset, men are forced to depart from established procedures, which have been set up by supervisors and tested by time and experience. Men think up new methods on the spur of the moment and try them out immediately. The mishaps and mistakes which have occurred under these circumstances convince me that the factors which promote continuity of operation are also the major factors contributing to a good safety record.

The basic requirements for smooth operating performance are well designed equipment, good process control, good personnel, good foremen. These are necessary to get smooth operation for one hour, or for one day. Yet with all these basic requirements satisfied, let the best plant ever assembled run for one day and it will not be as good a plant the next day unless it has been kept clean, orderly, and well maintained.

Housekeeping and maintenance are essential for efficient safe operation. To maintain a good safety record, the management must insist on a high standard of housekeeping and maintenance. In the final analysis, efficient operation and safe operation are earned by the foremen through efforts to keep the shop in such condition that operations can run smoothly.

Once a chemical process has passed through the "breaking-in" period, accidents and injuries are infrequent as long as operations proceed in accordance with regular routine. Disturbances of regular operation almost invariably precede accidents. Prominent among the causes upsetting routine operation are man failure, equipment failure, and entry of foreign material into process equipment. Equipment failure, in a large measure, depends upon maintenance, and housekeeping makes it possible for men to carry out their assignments correctly and reduces the possibility of foreign material getting into the process. Safety publicity stresses the principle that efficiency and safety go together, "The safe way is the efficient way, etc."

It is interesting to study the incidents which cause men to report to the Medical Department for treatment and see how many of these cases can be traced back to failures in housekeeping and maintenance in a chemical plant.

If you should look over the record in your chemical plant, I expect you will find at first glance that only 5 to 10 per cent. of the men receive treatment for strictly chemical injuries. At first glance it will appear that the balance of the cases are the same sort of bruises, falls, and collisions which injure men in plants outside of the chemical industry. However, if you look closely into the circumstances back of these incidents which cause your injuries, I expect you wll get another slant on the matter; for I expect you will find that chemicals have set the stage for a considerable percentage of the accidents.

Here is one extreme case as an illustration. A man reported at the Medical Department with a sprained foot incurred while hurrying down a flight of stairs. Apparently this lost-time accident was of a personal and mechanical nature until

the background was explored. Actually, a leak had developed, flammable vapors had escaped from process equipment, these vapors had flashed in the man's face and he had run away from the fire.

The case just cited involved chemicals and maintenance, and it is thought pertinent to cite another incident in which chemicals, maintenance, and housekeeping were all involved.

After a process was started up, operating difficulties developed in the grinding and screening end of the plant. It was necessary to open up and clean out the equipment quite frequently, and dust got around the shop creating bad working conditions. Cases of dermatitis occurred, and some men quit their jobs. These factors so complicated the picture that anticipated operating capacity was not attained. During this period there were several minor injuries, apparently due to personal and mechanical reasons. Gradually the "bugs" were worked out of the grinding operation, housekeeping was improved. The dermatoses and labor turnover disappeared. Operations moved along smoothly and the crop of minor injuries disappeared at the same time. Now it may be that the men in this shop all got safety-minded at the same time. But it is more probable that there was little change in their attitude toward safety throughout this period. As the shop was cleaned up the men had better jobs and did them better. That to my mind explains how and why that shop became a safe and pleasant place in which to work.

Employee System

Along with many other companies, we believe at Calco that good housekeeping can be promoted by means of the employee-inspection committee system. In general, we use a committee of four men consisting of a supervisor as chairman, a shift foreman, and one or two hourly-paid men. The inspection tours are made at intervals of two weeks, and cover both housekeeping and safety. At the end of the tour through a shop, the committee assigns ratings for conditions found on Form No. 1, and at the end of the tour the ratings assigned for the various shops are summarized as shown in Form No. 2. As this system is worked out at Calco, we believe it has brought improvements in housekeeping, and we find that the shop men almost universally accept the ratings assigned by these committees as arrived at by a jury of their peers. When the ratings are posted in the shops, the men take the findings of the committee to heart and do something about it.

These inspection committees actually make the inspection trips which the supervisors intend to make, should make, and so often fail to make. Because the men in the shops know that the inspection committees will come around, but do not know just when and where the committee is going to look, the improvements made by the shops, in anticipation of inspections, greatly exceed the progress arising from criticisms made by the inspection committee. By posting copies of Forms No. 1 and No. 2 on the shop bulletin boards, the men in the shops may learn just what points were criticized in their shop by the inspection committee and they can understand why their shop got the rating assigned.

We rotate details on the committees to get more men interested in improving housekeeping. For an hourly-paid man, a tour on the inspection committee enables him to see shops which he ordinarily would not enter; gives him new ideas on methods of work; and certainly makes converts for safety and housekeeping. It is interesting to see what an experienced operator will find as he goes through another man's shop. He picks up flaws which have gone by unnoticed, and in most cases he not only picks up the flaw but suggests a remedy which is actually workable.

What a Tour Discloses

Each inspection tour uncovers a new collection of junk and misplaced material tucked away in corners and cubby-holes in the shops. Part of this material can be salvaged and the balance is discarded, because trash and junk cannot be permitted in manufacturing areas. It gets in the men's way, it is available for the

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FORM NO. 1

Division "A"—Housekeeping Inspection

Div. A-1 Shop.....Bldg.....Date.....
Committee: Messrs. .....
.....

	Max. Rate	*Rating*	*Remarks*
	CLEANLINESS		
1. Floors, Corners, Roofs, etc.	7	.....	.....
2. Equipment, Tools	7	.....	.....
3. Yard, Ditches	7	.....	.....
4. Instruments, Shop Orders	4	.....	.....
Total Cleanliness	25	.....	.....
	ORDERLINESS		
1. Bbls., Drums, Bags, etc.	7	.....	.....
2. Closets, Lockers	6	.....	.....
3. Hose, Tools, Brooms, etc.	6	.....	.....
4. Platforms, Rubbish Stations	6	.....	.....
Total Orderliness	25	.....	.....
	SAFETY		
1. Goggles, Gloves, Respirators, etc.	9	.....	.....
2. Equipment, Guards, Railings	9	.....	.....
3. Showers, Masks, Fire Equipment	7	.....	.....
Total Safety	25	.....	.....
	MAINTENANCE		
1. Leaking valves, fittings, pumps	8	.....	.....
2. Condition—pipes, railing, equipment, etc.	8	.....	.....
3. Condition—paint in general	5	.....	.....
4. Condition—lights, windows	4	.....	.....
Total Maintenance	25	.....	.....
	SHOP RATING		
Cleanliness	25	.....	
Orderliness	25	.....	
Safety	25	.....	
Maintenance	25	.....	
TOTAL	100	.....	
Handicap		.....	
Final Shop Rating		.....	

.....
Signed.....

untrained man to use in an unsafe manner to do a hay-wire job, and worst of all, it gets into process equipment and makes trouble.

When rags, bolts, nuts, and the like get into process equipment, trouble is surely ahead. These articles plug kettle outlets, block pipe lines, foul valves so that they cannot be closed tightly, and cause all kinds of operating trouble. When trash gets into operating equipment it runs up maintenance expense and causes breakdowns, it contaminates products and causes off-grade production through interference with process control.

How Not to Close Valves

Among the interesting items which our inspection committees have found are iron bars and pieces of pipe which men have saved to close valves tightly. Obviously, a valve which needs the use of a bar to close it tightly should be repaired or replaced. Committees have found little blocks of wood which men have used to hold a motor starter in running position, thereby setting the stage for a burned-out motor in case of an overload. The committees find iron braces tied up to keep belts from slipping off pulleys under heavy load. On the basis of maintenance costs alone, such things cannot be tolerated.

From the viewpoint of safety, there is a more important reason for getting rid of gadgets; namely, that they block out safeguards engineered into the process equipment. When these gadgets are used, situations which normally would be of minor importance may develop into serious affairs because a gadget interferes with safeguards provided to handle such a situation.

Persistent emphasis on shop housekeeping makes a plant a better, more pleasant, and safer place in which to work. There is an even more obvious connection between maintenance and safety in chemical plants.

Maintenance in a chemical plant is a big and varied job. In the course of this work, men often get in contact with process material. When equipment is taken apart, chemicals are encountered unexpectedly and in surprisingly large quantities on occasion. For this reason, maintenance men as a group probably encounter the widest range of exposure of any group in a chemical plant. Protection of maintenance men against injury during repair work is a major item in the safety program of a chemical plant.

The chief contribution which maintenance makes to smooth operation is by preventive maintenance, by fixing the little faults before they get troublesome. Preventive maintenance is equally important to safety because a shop cannot roll along smoothly unless a multitude of little jobs are covered each day by the maintenance group. Preventive maintenance rather than repair work is the desired goal. With organic chemical processes, which so often involve handling of a wide range of corrosive materials, the services of a competent group of equipment inspectors are particularly valuable. By external and internal inspection of process equipment, these men detect incipient failure due to corrosion and wear before the trouble actually develops, and they contribute tremendously to safe operation.

Where Accidents Occur

One strange thing about chemical plants is that the really tricky process steps cause relatively few accidents. Another strange thing is that most of our troubles arise from neglect or failure on minor details. Many of these failures do little damage and could easily slip by as matters of little importance except for the fact that the industry has learned that every so often a little error results in a spectacular injury. One good way of convincing the maintenance men in a chemical plant that it is important to do each job carefully and thoroughly in order to advance safety, is to stress the spectacular incidents and tie them right back to a minor failure which set the stage for the big show. Let us consider a few such incidents.

The suction piping on a pump installation was disconnected and when it was put back a mechanic failed to pull up a pair of flanges evenly. The job held for some time and then failed while a hot caustic solution was passing through the system. The ring gasket which had failed showed plainly where it had been pinched on one side and lightly gripped on the other side. As this failure had caused a painful burn, the faulty gasket was used on a poster to publicize the results of sloppy work.

A flanged valve was replaced on the bottom of an alloy kettle. The kettle, the valve, and the bolts used to make up the flanges, all had to be alloy; but mechanics used one steel bolt. When this bolt corroded out, the flange opened and a ton of hot acid cascaded over the floor. This incident helped to convert mechanics to safe practices.

Maintenance and Safety

The fact that maintenance and safety go together was forcibly demonstrated to the writer shortly after graduation. After a small maintenance job, a mill was started up, and then it stopped with a terrific uproar. We took the mill apart and found the rotors were jammed on a wrench and on the handle of this wrench were the initials of the maintenance man who owned it. This was conclusive proof to a young chemical engineer that maintenance men influence safety in a chemical plant.

Today, safety vitally influences the operation of American industry. The safety movement is relatively new. The spade work on the safety movement was done from 1907 to 1912 when the National Safety Council was organized. Today safety is promoted by company policy, by laws, and by workmen's compensation awards. A growing realization of the importance of occupational disease indicates that safety will become even more important in the future.

Regulations, laws, and emphasis by management—all promote safety. But there is another factor which even more effectively promotes safety today. This is the realization of supervisors, after an accident, that the accident occurred because they did not do a good enough job to stop that accident before it occurred; that the accident was due to inefficiency. This realization leads inevitably to the conclusion that the way to prevent accidents is to clean up the shop and maintain operating equipment so it can run efficiently and safely.

FORM NO. 2

Division A-1 Housekeeping and Safety Inspection Form

Inspectors: Messrs. .....

Shop	Cleanliness	Orderliness	Safety	Maintenance	Total	Handicap*	Final Rating
I	21	21	24	23	89	6	83
II	23	23	23	19	88	6	82
III	21	21	24	21	87	5	82
IV	22	24	24	21	91	10	81
V	22	22	22	21	87	6	81
VI	21	22	23	23	89	8	81
VII	22	22	23	17	84	4	80
VIII	20	20	23	17	80	0	80
IX	(shut down)						

General comments on conditions found:

.....

.....

.....

*NOTE: This division assigns handicaps to various shops to cover differences in size and type of process and process equipment so all shops compete on an even basis.

BUILD *for* Permanence

By W. J. Austin
President, The Austin Company

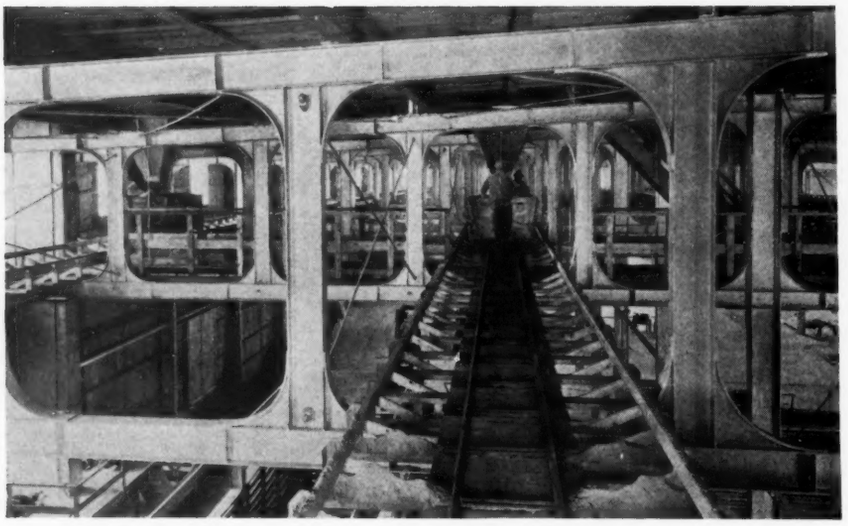
WITH chemical industries developing and expanding on every side and the products of chemistry finding their way into almost every field of human activity, one cannot talk about chemical plants today in any narrow sense.

The production of plastics and synthetic textile yarns, of high compression motor fuels and cutting gases, requires specialized construction to meet the particular needs of many new chemical processes. The revolution that has come about in food packaging and preservation has imposed the necessity for new controls applying to food chemistry.

Progress in the research laboratory, by heating and ventilating engineers, by structural designers and by the building supply industry itself has made it possible to meet such requirements with construction which would have been impossible twenty years ago. With new chemical-resistant metals of enduring character; with air conditioning systems which accurately control temperature and humidity; with induced ventilation to keep all fumes, dust and gases under control, and with modern handling devices to do much of the work, chemical plants built today can be designed for long-term use.

Tent type corrugated iron sheds which were the only outward evidence of vast investments in chemical plants of the past are now going into the discard. True, they serve a definite purpose and can be written off in a short span of years so that one always has a minimum tied up in plants. But with the materials available today, and a period of basic progress in process development behind us, the economy of such construction is in many instances open to serious question.

To be sure one has to gamble on the fact that progress will not render a permanent plant obsolete before its time. There are industries, however, which seem to have passed the critical phases in their evolution and these are likely to sail steadily ahead, with a minimum of



Cars pass through the portal trusses in this modern mechanized fertilizer plant. First commercial application of this all-welded rigid frame truss, designed by the Austin Company

change. With this outlook, the labor required to erect plants of short life becomes a disproportionate item of expense.

In the new bicarbonate of soda plant recently completed for Church & Dwight at Syracuse, all of the aforementioned factors contributed to the solution of challenging problems. The management wanted a modern plant which would symbolize the reputation for purity of product built up over a period of 90 years. Firmly convinced that a building could be designed which would take care of any future changes, they approached the project as a long-term investment.

Here was a process which required a building in three distinct parts, each with a maze of tanks, piping, conveyors, and other mechanical equipment. Given definite specifications and a basic layout for all the required equipment, our organization approached the job as a packaging problem. The elements were much more complex but the purpose was the same—to create an attractive exterior, inside of which all the basic equipment and controls could be accommodated.

The interior layout of the Church & Dwight plant is reflected in the functional lines of the exterior. Glass block, which has been introduced to break the massive walls of buff face brick, takes the form of narrow, vertical shafts at the stairways, while tanks which tower eight stories high are suggested by a checkerboard of vertical panels in glass block on the facade. A curved corner suggests the massive tanks which are nested snugly inside, and horizontal bands of glass block parallel conveyor systems, laboratories and offices along the front. The entrance is distinguished by three recessed shafts of glass block, which back up limestone slabs introduced for ornamentation as well as to break up the light which floods the principal stairway.

Once inside, the problems of designing an attractive plant to accommodate the equipment for a modern continuous process are quickly apparent. There are unobstructed areaways to the roof, tailor-made ventilating and air conditioning facilities for each major department, and structural innovations required to support 250-ton concrete bins and other comparable loads. In the latter aspect of this work, welding played an all-important part. Without it, as a matter of fact, concrete tanks could never have been used for they had to be lined with a metal that would resist chemical action over an extended period—and this meant welding stainless steel.

In operation, this plant provides complete control over all the materials in process. Totally enclosed conveyors handle the product which is delivered in a continuous flow.

An interesting example of concrete tank construction applicable to widespread use in the chemical field is to be found at the Crown-Willamette mill of the Crown Zellerbach Corporation at Camas, Washington, where the use of a special patented construction system facilitated erection of a 1,500,000-gallon filtered water storage tank at a cost of only $30,000.

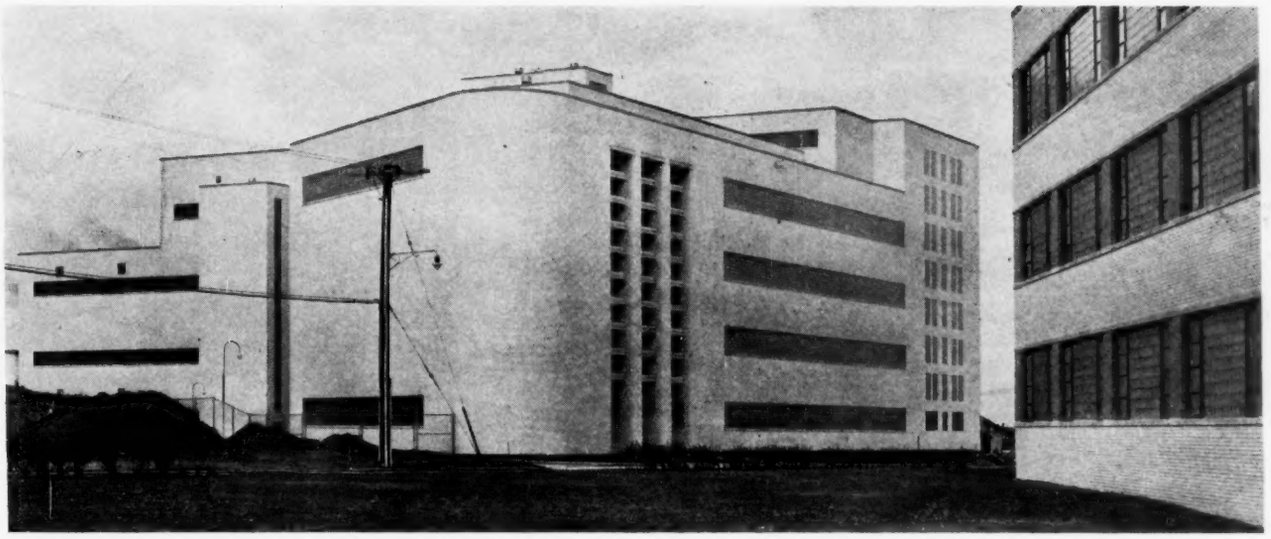
Under the patented Hewitt system, the tank walls were constructed in vertical sections. Recesses were provided for in the forming of wall exteriors, to permit attachment of turnbuckles to the circular rods which were placed after the tank walls and the dome had been completely poured. Spacing of these rods was provided for in the design and they were taken up with special tools so as to provide specified initial stress in the rods and in the concrete. The turnbuckle rods were covered over with gunite after the adjustments had been made. In this way the concrete was placed in compression, and difficulties caused by expansion and contraction were reduced to a minimum.

As the result of improved techniques in the use of concrete and advanced welding practice many new structural forms have been developed. They are reflected in steadily increasing application of functional design to chemical plants. One of the most promising of these new forms is the rigid frame portal truss which eliminates all web members and maintains clearance for the passage of conveyors through the roof supports. In the International Agricultural Corporation's fertilizer plant at Chicago Heights, Illinois, industrial cars operate on intercommunicating tracks which extend through the truss portals. The basic chemicals are unloaded into an elevator pit, raised by bucket elevator to a penthouse where a transverse belt conveyor distributes them to hoppers from which the industrial cars are loaded. The raw materials are then conveyed to base piles in various sections of the structure by these cars.

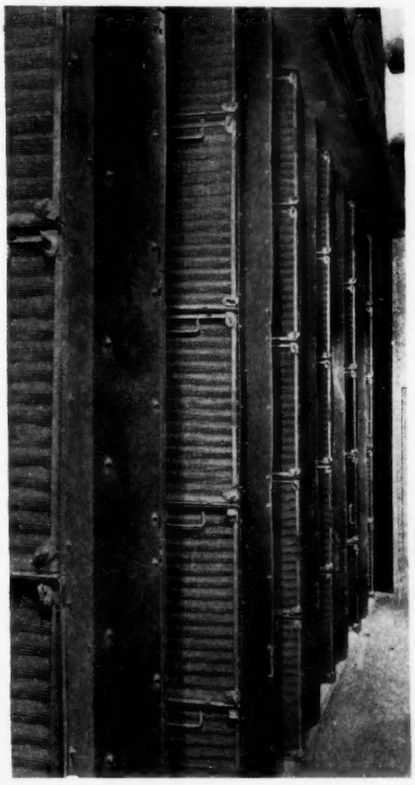
The portal truss design can be utilized for various types of conveyors. They may

The Author—W. J. Austin

"There are industries which seem to have passed the critical phases in their evolution and these are likely to sail ahead"



Modern plant where Church & Dwight turns out its familiar Brand and Arm & Hammer Brand baking soda. Actually just an attractive air-conditioned package to support and enclose conveyors, carbonating towers and 8-story tanks. Entire framework was electrically welded.



Air mat filters through which passes all air entering the Church & Dwight plant

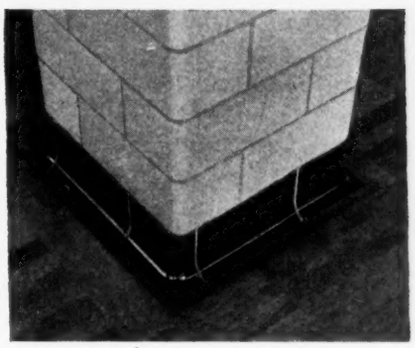
be suspended from the top cord of the truss or operated on monorails suspended from the bottom, just as easily as on tracks. Any two, or all three, of these levels could be used in combinations, where more than one overhead conveyor system was required.

While most industries have been swinging toward single-story plant construction, the importance of gravity flow in chemical processing establishes this field as a ranking builder of multi-story structures. At the same time there is a predominance of single-story plants, even in this field.

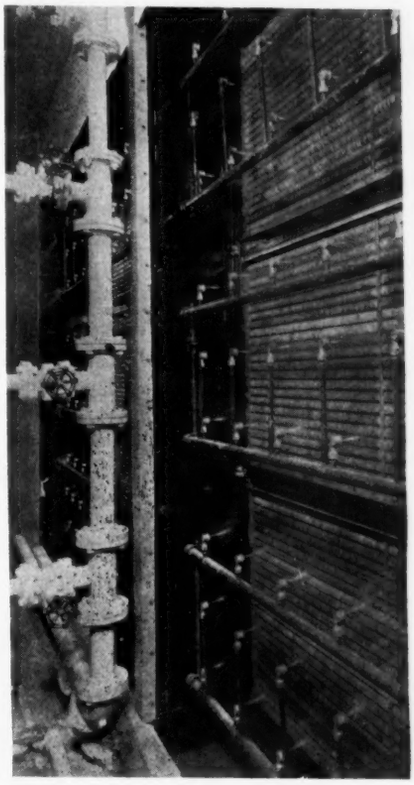
Today all the precautions necessary to insure maximum safety are built right into chemical plants of every type. Fumes and dust generated in processing are kept under control—either by completely enclosing equipment or by removal through special exhaust systems. Open areaways are guarded by substantial handrails, and non-skid stair treads are in general use.

No other industry provides a greater challenge to the engineer intent on maintaining complete accessibility of all equipment with maximum safety. With the aid of cutting gases on one hand and welding on the other, it is possible to carry steel flooring or supports right up to the equipment, and eliminate important hazards.

As improved highways and tractor-type transports have emancipated chemical producers from absolute dependence upon rail facilities, other developments have freed them from reliance upon public utilities. Modern industrial power plants, burning vaporized oil, pulverized coal, or natural gas, are today achieving a high thermal efficiency which compares favorably with the public utilities and at the same time provides process steam, usually required. Compact Diesel generating units are also available in a wide range of sizes for the plant which does not need steam for processing. Thus, it is now possible to operate at any location indicated by the availability of raw materials and accessibility of markets, whether or not public services and carriers are present.

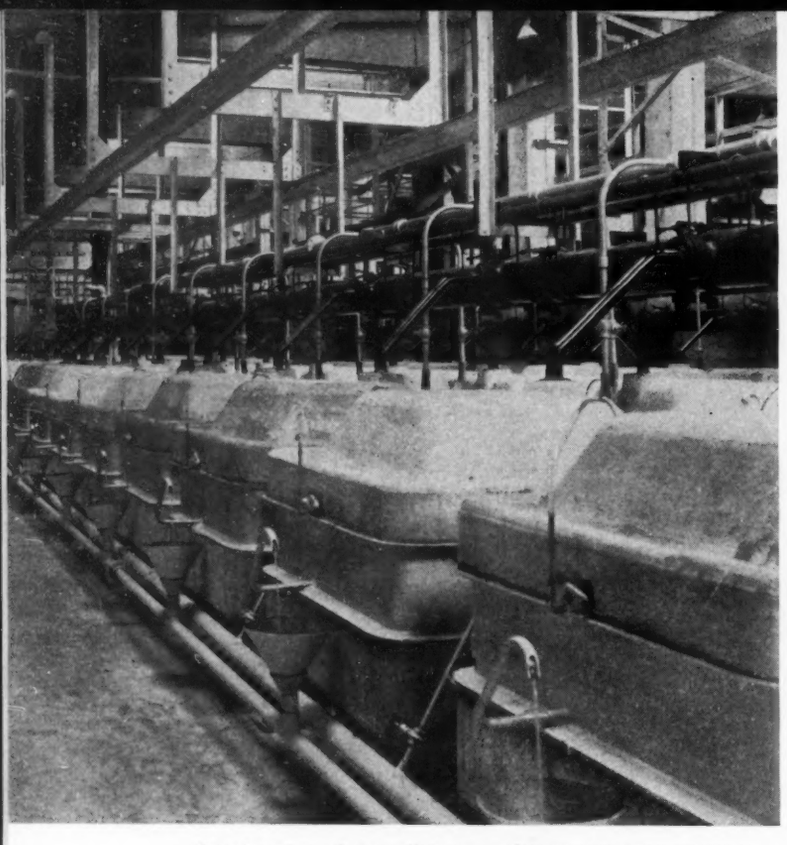


Ceramic tile insures cleanliness around columns and walls



Uniform atmospheric conditions are maintained through use of de-humidifying chamber

The problems confronted by chemical producers in trying to keep pace with ever-broadening markets have created a definite demand for more adequate research facilities. While some concerns have already recognized this need, the next few years should see the construction of many additional laboratories for experimental work and testing. This industry has been built on research and those who have made the basic contributions to chemical progress have a right to the working comforts which modern laboratories offer.



Interior view of the cell house at the Hooker Electrochemical plant at Niagara Falls

WHAT PRICE *Chemical Plant* *MODERNIZATION?*

AT just what point does it become economically advisable to modernize chemical equipment and existing methods of manufacture? What can modernization of chemical plants include? What are the principal factors you must constantly keep in mind? Here are the answers prepared by experts to these and other pertinent questions involving the modernization of chemical equipment and plant layout.

AS the years roll by new inventions and discoveries are made and new materials, machines and instruments are put on the market. At the same time old plants and equipment are wearing out and need replacement and market changes affect the desired quantity or quality of product or of raw materials which make it desirable to effect changes in the scale of operation or in the exact details of operation. Furthermore, in all the newer processes experience is constantly gained showing how operation of the plant can be facilitated. When the effects of all these factors accumulate to a certain point they may become the reason for, and it may become economical to, modernize a plant or process by making changes, in some cases perhaps not very drastic but oftentimes even revolutionary. There is frequently in evidence a tendency not to change the plant as long as it is making satisfactory profits but the introduction of rival processes frequently precipitates such action.

Broadly speaking, modernization of chemical plants can include:—

1. The making of long delayed repairs.
2. The replacement of worn out units by similar new ones.
3. The replacement of units not necessarily worn out, by units of improved design to carry out the identical process. Such new equipment may be of a more suitable size, may be easier to operate or repair or of more durable material or may be merely better constructed.
4. Making use of improved physical or mechanical means to carry out the identical process, such as mechanical conveyors for handling materials, better designed heat transfer equipment employing forced circulation, automatic controllers of temperature and pressure, improved pumps or compressors, or continuous operation instead of batch operation.
5. Employment of new chemical reactions involving rather complete revamping of plant but employing the same raw materials and making the same finished products.
6. Changing over to different raw materials which quite frequently necessitates some modification in equipment.
7. Superseding one finished product by another to serve the same general need as for instance switching from bleaching powder to liquid chlorine.

Modernization should involve the adoption of the best equipment available at the time the plans are made. Owing to the great time lag in the development and commercialization of inventions we are often forced to use devices which are already obsolete, in the sense that something better has been discovered or invented, though not yet available on the market.

Aims of Modernization

In a broad way, the modernization of a plant should at least aim at such instrumentation, testing and control methods and record keeping as to facilitate determination of exactly what is going on in each piece of apparatus. It should aim at providing sufficient working space and avoiding inaccessible areas. It should aim at locating all vital controls and instruments at one convenient point. First and foremost, every precaution should be taken against fire, explosion and health hazards. Where there are necessarily such risks it is desirable that every point in the plant should be accessible by at least two routes and blind walkways carefully avoided. In changing over an existing plant it is of great importance to keep apparatus accessible for operation and for repairs, thus avoiding inconvenience. Modernization should make for foolproofness primarily to avoid accidents, damaged equipment and spoiled product. For instance, frequently valves can be arranged to close or open simultaneously, so as to stop the feed of one reagent if the feed of another fails. Similarly interconnected switches to synchronize operation are frequently used. It is often worth spending considerable money to make the plant adaptable to a cost accounting system, by installation of meters, recording gauges and weighing machines at proper points and keeping records not only systematically but in such a way that the figures really show any change in costs and just where such change has taken place. In some cases plants may be modernized by the installation of systems of analytical control which really guide the operations—making sure that the analyses are made by an expeditious method and just when required. Parts of the steel industry afford a notable example of this.

Usually, one of the first considerations in modernization of a plant is what parts of the existing installation can be retained or employed. Can existing buildings, storage tanks and equipment economically be made use of and what is the minimum change that can be made

The authors: Left, Robert Lindley Murray, Director of Development, Hooker Electrochemical Co., Niagara Falls, N. Y.; right, A. H. Maude, Chemical Engineer with the same company.

and still yield the desired results? These considerations often make the modernization of an old or existing plant a much more difficult engineering problem than building a new one. Modernization, based on operating experience, may in one sense of the word consist of even such minor changes as the relocating of a valve where an operator is more likely to attend to it or the installation of a sight glass or of a recording thermometer. It may consist of a replacement of some piece of machinery not functioning properly or needing excessive repair or it may consist of a complete change of the entire layout. New, up-to-date machinery often has the indirect advantage of economy in floor space, this being particularly noticeable in the case of motor driven direct connected high speed machines or ones designed for V belt in place of flat belt drives, a typical example of this being direct connected synchronous motor driven refrigerating machines, compressors and pumps.

Physical Processes

A new physical process occasionally enables great advances to be made. An example is the concentration of various chemicals such as acetic acid by solvent extraction, instead of by the older distillation methods, the purification of caustic by crystallization of various hydrates and perhaps most notable of all, the flotation separation of minerals previously not commercially separable or only separable by expensive and elaborate processes. A process is sometimes modernized by including a purifying or drying step which adds to the life of equipment or raises its output or lengthens the life of a catalyst. Examples of this which may be cited are the elimination of dust and other impurities in sulfur dioxide gases which are to be used for sulfuric acid manufacture, the drying of chlorine gas prior to use in chlorinations, elimination of catalyst poisons prior to hydrogenation, etc.

Question of Economics

Modernization is frequently brought about by the availability of new machines, instruments or materials of construction. Such changes must be shown to be economically sound by greater efficiency in the use of raw materials or in the consumption of heat or power or labor. Frequently, as it is developed more and more, such new equipment is reduced in price to a point where its purchase and installation bring a sufficient return, in the form of savings, whereas previously, high prices had made the returns insufficiently attractive to justify the replacement of old apparatus. Examples of such developments are very numerous and may be typified in the heavy chemical field by belt conveyors with continuous weighing attachments, centrifugal compressors which replace the reciprocating type with, in some circumstances, a saving in power, etc. In the organic chemicals and intermediates field a device gaining favor for certain reactions but requiring great engineering skill in its design and involving difficult development problems is a reactor in the general form of a ball mill. Instead of bringing the reactants together in solution they are brought together as pastes. Thus the quantity of solvent, in many cases, is greatly reduced and likewise the size of the reactor. The device may be constructed of various metals and may be cooled or heated and operated under pressure or vacuum.

New Machines

Sometimes a new machine makes possible an operation previously quite impossible. Examples are the supercentrifuge or the Cottrell precipitator. Other times it makes practical an operation previously quite difficult or bothersome, namely liquid sealed centrifugal compressors for chlorine compression. Often new and improved machinery makes continuous instead of batch processes possible; for example continuous centrifugals, rotary filters and continuous thickeners and classifiers. Frequently great savings are made by the development of such continuous processes as compared to batch processes. In general, a continuous process is justified by a large scale of operation, the fundamental benefit being that each part of the system is in continual use usually close to its full capacity. Each part is adapted to perform one small differential of the whole process and can be made as nearly as possible ideally suitable for that particular part of the whole. If the material is to be heated, mixed, and cooled, it is frequently heated in one portion of the equipment especially adapted for heating only, mixed in another part adapted just for mixing, and cooled in a section designed only for cooling. Continuous processes usually lend themselves to economy in energy and labor and to uniformity of operating conditions and hence of product.

Methods of Heat Transfer

Improved methods of heat transfer have played an important part in present day modernization of chemical plant equipment. In this connection may be mentioned forced circulation evaporators, condensers equipped with circulating pumps, the use of hot oil or Dowtherm instead of direct firing, and various forms of electrical heating such as strip, bayonet or induction. In modernizing a plant it sometimes becomes necessary to attain a temperature somewhat in excess of the steam at the available pressure; in that case recompression can be resorted to

which raises the pressure and hence the temperature of the steam at the cost of condensing some of it and using some of the energy. This same idea has been applied to recompressing steam between the stages in multiple effect evaporators thus attaining improved heat economy. A frequent combination in chemical plants which makes for great economy is the generation of steam at high pressure and its utilization through turbines to a pressure economically usable in chemical apparatus and at the same time generating the required electric power; thus high pressure boilers and "bleeder turbine" power have had a marked influence on present day chemical economics.

Materials of Construction

The discovery and development of new materials of construction frequently permits the fabrication of much more desirable equipment resulting in greatly reduced repairs. Examples of this are nickel cast iron for caustic fusion pots, nickel tubes and nickel clad steel for caustic evaporators, aluminum tanks and pipe lines for acetic acid, and rubber lined steel tanks and pipe lines for muriatic acid. The production of large scale glassware has made possible the bulk handling of highly corrosive material in glass, and heat exchangers of this material furnish remarkably good heat transfer despite its low thermal conductivity owing to high film coefficients resulting from its smooth, easily cleaned surface. A field which may have a big future in the design of apparatus suitable for highly corrosive conditions is that of plastics. These highly resistant and mechanically strong substances would appear suitable for many chemical uses even as they have been employed for electrical and other uses. Even now tanks and pipes of this class of material are available.

Improvements in chemical stoneware making it capable of resisting quite drastic temperature changes should also be noted, as well as the development of tellurium lead, copper bearing steels and many ferro alloys of great chemical engineering importance. Tantalum, Hastelloy and silicon bronze are also finding a real place and are playing a definite part in chemical plant and equipment modernization. Recently it has been demonstrated that tantalum is ideally suitable not only for heating and cooling hydrochloric acid solutions but also for heating units for concentration of sulfuric acid of certain strengths which corrode iron, as this tantalum preserves a bright surface and furnishes heat transfer quite superior to lead. Other materials finding use in chemical equipment particularly for extremely high temperatures are silicon carbide and fused alumina. The more important developments in corrosion resisting materials also include carbon fabricated in the form of tubes, bricks and various shapes. The well known inertness of this material makes it ideal for cooling and heating tubes for highly corrosive acids including hydrofluoric and phosphoric. The development of spun glass has had its effects on chemical practices in the use of glass filter cloth and now glass packings. Much new equipment is now being fabricated of rubber and this important material is finding an ever widening use.

Dust Removal

The problem of dust removal is never completely and satisfactorily solved. Cyclonic separators leave much to be desired and the multiclone which is based on the same principle but using a smaller radius attaining more complete separation is difficult to construct on a large scale. Recent developments in the blast furnace industry point to improvement of water washing systems and the development of high velocity sprays which are able to wet down dust even when it has a water repellent nature. The replacement of reciprocating machines by steam jet evacuators, which are made in multiple stages with interposed condensers where high vacuum is needed, eliminate moving parts and mitigate troubles due to corrosion and gumming. An interesting application of elementary principles of structural strength is the use of spherical containers for gases under pressure or liquids with high vapor tension. It seems not improbable that detailed study of packed fractionating columns will show rational designs to give in some cases performance superior to the more usual bubble-cap type, particularly for vacuum distillation and for corrosive materials. Other developments deserving special mention are the arc rectifiers which are replacing rotary converters and motor generators in electrolytic industries where DC current is needed. They avoid the maintenance inherent in moving machinery and are more economical in power in the higher voltage ranges.

Another big step in modernization is instrumentation. Frequently a process is worked at poor efficiency simply because the operator in charge has no way of knowing just what is going on inside his kettles, columns or autoclaves. Often the rate of flow of a reagent is judged just by looks or by the position of a valve and the installation of a flow meter gives immediate improvement. If temperature recorders or pressure recorders are installed at the right points, great improvements are almost sure to result in the operation. Marked advances have been made in the mechanism of recording potentiometers until their use for control of temperatures, outside the range of mercury or vapor tension instruments, is very reliable. Sometimes an instrument reveals conditions totally unsuspected previously. A pH indicator is an example of this kind. It has assumed a preeminent position among chemical control devices and has most important applications in many fields. Recording instruments telling a continuous story are a great improvement over indicating types at all important points. Such indications often greatly increase production by improving yields and eliminating substandard product. In many cases a control instrument actuated by pressure or temperature, permits smooth operation of a process which is otherwise irregular and difficult if not even quite impossible without adequate automatic control.

Flow of Reagents

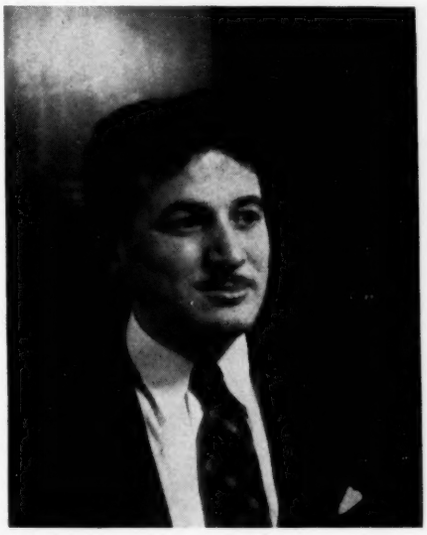
Instruments for proportioning the flow of reagents have been developed by adapting the orifice type of meter to actuate valves. The problem of transforming the small movement of an instrument diaphragm to control directly a force powerful enough to actuate valves or dampers has been ingeniously solved in one regulator in which a delicately suspended jet delivers a flow of oil into the actuating mechanism. The photoelectric cell has been applied to convert the rotometer to a control instrument. Photoelectric cells have also permitted operations previously dependent on the human eye to assume an automatic character. A slight turbidity or a color interposed between a light source and the cell will make or break a current which is amplified to turn valves or to start and stop motors. They have found application in recording and controlling dust in gas, smoke, and turbidity in filtered liquids, and are also used as indicators of temperature of incandescent masses. Making use of the electric conductivity of flames, devices have been perfected which on failure of the flame will turn off the gas, thus removing the hazard in connection with gas fired furnaces.

First a Detailed Study

A consideration of the preceding discussion will show that the majority of chemical factories will bear modernizing in the sense that better equipment and design is available now than was obtainable when they were built, but only a most thorough and detailed study of the economics of the situation combined with the most up-to-date chemical engineering knowledge can satisfactorily answer the problem of when and to what extent the scrapping of apparently obsolete equipment is in reality justifiable and when recommendations should be made to the directors that such changes be made.

Laying Out a Modern Industrial Laboratory

AT one time the research and control laboratory was viewed by company executives as a sort of necessary evil and was fitted into spaces for which there seemed to be no other use. Happily, this era is over. Readers of Chemical Industries are fortunate in having this description of one of the country's outstanding new laboratories written by the man who had most to do with its complete design and layout.



By Irving E. Muskat, Ph.D.
Director of Research
The Columbia Alkali Corporation

IN 1936 it was found that the research activities of the Columbia Chemical Division of the Pittsburgh Plate Glass Company at Barberton, Ohio, whose products—caustic soda, soda ash, chlorine, bicarbonate of soda, calcium chloride, and related products—are marketed by The Columbia Alkali Corporation, had expanded to such an extent that an increase in laboratory space was imperative. Accordingly, a new addition to the original laboratory building was erected and the entire laboratory was completely modernized to accommodate its increased requirements.

The laboratory is now housed in a four-story, rectangular brick building which is 128 ft. long and 32½ ft. wide. All floors are of reinforced concrete and are supported by steel I-beams. The roof has been constructed so that it may be raised to permit the addition of another story when it is needed. This building accommodates both the research and the analytical laboratory.

The main entrance to the building is on the second floor, and leads to a foyer which is constructed of Lumite glass blocks. The research director's office clerical offices, the library and the main analytical laboratory are located on this floor. The floor above is divided into two large rooms, providing 1600 and 2300 sq. ft. of floor space respectively, in which organic research is conducted, and a smaller room in which the microanalytical laboratory is located. The first floor also is divided into two large rooms, which are used for general organic and physical research and a small room which is used as the main storeroom. The basement which extends under one-half of the building is not partitioned and is used for micro pilot plant investigations. The building is also provided with an attic which is used as an auxiliary storeroom for chemicals, equipment and reference literature.

The interior walls of the building are surfaced with matt-glazed ivory tile. The floors of the older part of the laboratory are made of painted concrete. In the new portion, however, the floors are surfaced with a mastic cement. Illumination is secured by use of 300 watt lamps which are recessed flush with the ceiling. The ceilings of the director's office and the library are covered with acoustic tile.

All laboratories in which research investigations are conducted are located in large, well-ventilated rooms, most of which provide floor space of 1500 sq. ft. or more. Each laboratory is equipped with a series of laboratory desks alternating with a series of equipment racks. The laboratory tables are divided along the center by a shelf, a waste trough and various service lines and are equipped with stone sinks. Table tops are of treated birch. Service lines supplying hot and cold water, 90 pound compressed air, 110

volt alternating current and 220 volt direct current are connected to each table. All waste lines are of Duriron. Individual storage cabinets are located under each desk and are provided with sliding glass doors.

The equipment racks are constructed in the manner illustrated in the accompanying photograph being provided with a number of spaced horizontally and vertically disposed stainless steel rods which are mounted upon a wooden rack framework, which in turn is mounted upon a low wooden bench. These racks are serviced with gas, steam, 90 pound compressed air, hot and cold water, 110 volt alternating current and 220 volt direct current.

Microanalytical Laboratory

The microanalytical laboratory, located on the third floor, is enclosed by glass partitions, in order to permit the maintenance of a dustless atmosphere. Air entering this laboratory is heated by a thermostatically controlled radiator unit and is filtered through glass wool. The laboratory is of the standard Pregl type, utilizing a Kuhlmann balance and is equipped for the usual microanalytical determinations. The balance is mounted on a rubber ball suspension.

The main storeroom located on the first floor is of fireproof construction and has a ventilated room which is especially adapted for storage of solvents and other inflammable material. This room is provided with a thermostatically controlled firedoor which automatically closes whenever the temperature of the room increases materially. In addition, the controls actuating the firedoor release carbon dioxide into the room simultaneously, to extinguish the fire. All chemicals and equipment are distributed from this storeroom. Stock room records are kept by a filing system which includes perpetual inventory cards.

A rubber testing laboratory which is equipped for rubber compounding and testing work is also located on the first floor. This laboratory is equipped with a 12 inch open rubber compounding mill, a small Banbury mixer, a steam heated press for curing rubber sheets, a Bierer-Davis air oxidation bomb and a Scott testing machine. On the same floor is located the physical testing laboratory which is equipped for various physical testing methods, including microscopic, colorimetric, and electrometric tests. This laboratory may also be used as a dark room for development of photographic films.

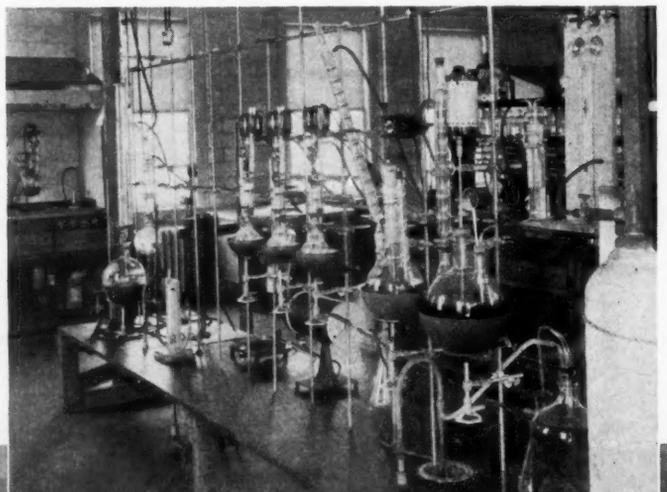
The tool room is on the first floor. This room is equipped with a lathe, a drill press, a work bench, a glass blowing table and numerous other tables. This permits the design and construction of much of the special equipment which is found necessary for the various research problems.

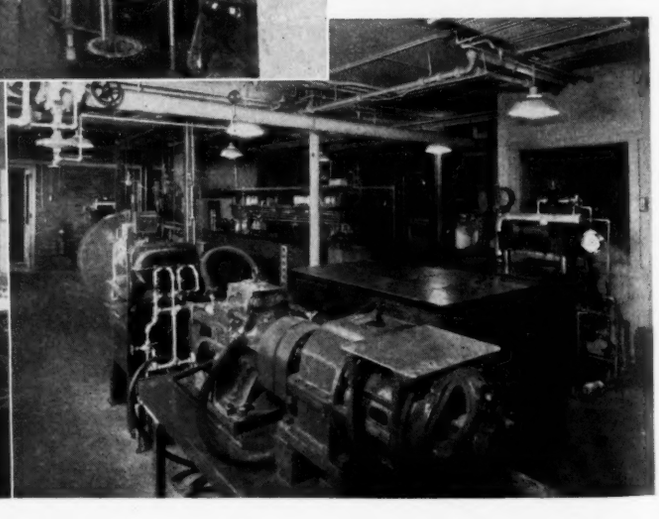
The basement is devoted to micro pilot plant work. In addition to the usual services, it is equipped with high pressure gas (25 pound), 440 volt alternating current and 140 pound steam.

All floors are connected by an elevator, and much of the equipment is mounted on wheels so that it may be taken to any part of the building by means of the elevator without difficulty. A large centrifuge and a motor-generator set providing low-voltage high-amperage current for electrolytic work are included in the equipment of this type. Much special equipment, such as high-pressure autoclaves and bombs designed in this laboratory, is in use.

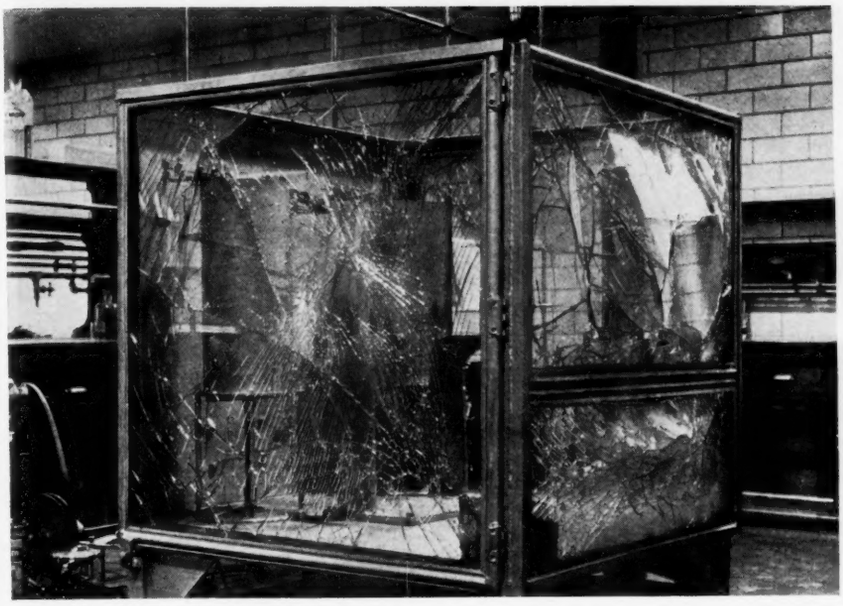
Design of the Library

The library, located on the second floor, is designed to permit its use as a reading and conference room. It is provided with the more important reference books and technical journals and carries a current subscription list of many technical periodicals. The more important of these periodicals are bound and kept in the library for reference while the remainder are stored in accessible places. An especially designed magazine rack is used for





Right, special equipment racks were constructed with a number of spaced horizontally and vertically disposed stainless steel rods which are mounted upon a wooden rack framework, which in turn is mounted upon a low wooden bench. Below, a typical laboratory, well-ventilated and containing at least 1500 sq. ft. of space. Below, right, part of the rubber testing laboratory.



Special types of glass have been used throughout the laboratory. Much special equipment has been constructed of those materials for particular investigation. Photograph shows special equipment for conducting high-pressure studies.

current periodicals. An extensive file and index of American and foreign patents as well as special digests or collections of literature which relate to subjects which are of particular interest to the research organization are also maintained.

Open-Face-Type Hoods

The laboratory is ventilated for the most part by open-face-type hoods which are liberally distributed throughout the building. Fifteen to twenty air changes per hour are exhausted through the hoods and auxiliary louvres by blowers operating through a Durimet duct system. These blowers are located in the attic. Fresh air is introduced through louvres in the outside wall. The incoming air may be heated, if necessary, by passing it through finned-tubed heating units as it enters the building.

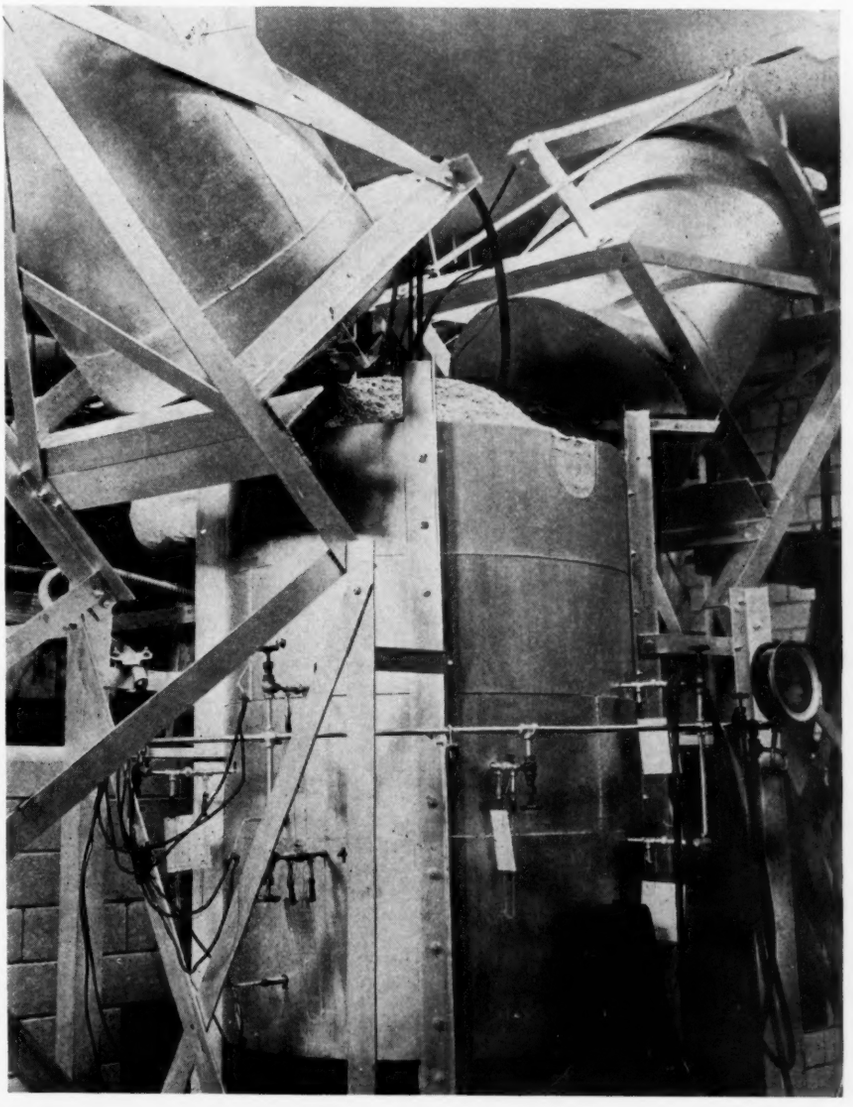
Full Use of Glass

Full use of many of the modern forms of glass is made throughout the laboratory, including tempered glass for special hoods and safety laminated glass shields which are bound with metal edges. Much special equipment has been constructed of these materials for particular investigations. One of the more important structures of this character is a transparent glass bomb which has been used for high pressure studies. This bomb is constructed of heavy pyrex glass and is housed in a temperature controlled compartment, the sidewalls of which are made of Duplate safety glass. The construction of this device is such as to permit an operator to conduct high pressure studies and observe operating conditions within the bomb at all times during the investigation with no danger of injuring the operator. The device has been used successfully for many tests and has proven to be entirely safe. At one time the bomb exploded after it was subjected to an extensive pressure. The Duplate sidewalls successfully withstood the force of the explosion and while it was fractured by the shock, it was not punctured.

The laboratory is equipped with the usual safety and fire extinguishing devices. Since chlorine and poisonous gases are sometimes used in investigations, full face gas masks are provided at convenient places in the laboratory for emergency use.

Pilot Plant

In addition to research facilities in the research laboratory building, a large building is maintained for pilot plant investigations on a semi-commercial scale. In this way it is possible to solve numerous problems on a small scale and develop preliminary pilot plant processes in the laboratory. After these processes have been developed to a reasonable scale, larger pilot plants are constructed in the pilot plant building to finally determine their commercial feasibility.



A close-up view of one of the pilot plant units. Here practical data on commercial batch making are easy to obtain.

Figure 1

Typical "dead front" distribution switchboard with air circuit breakers of the "roll-out" type.

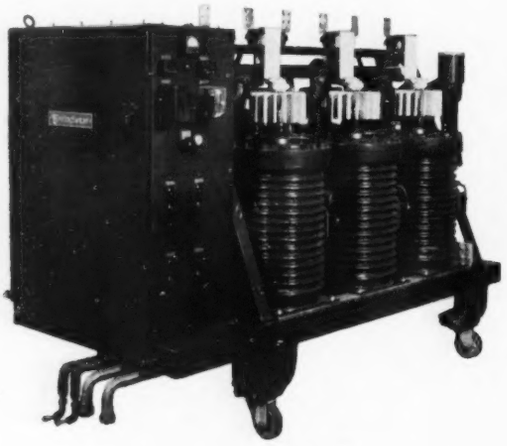
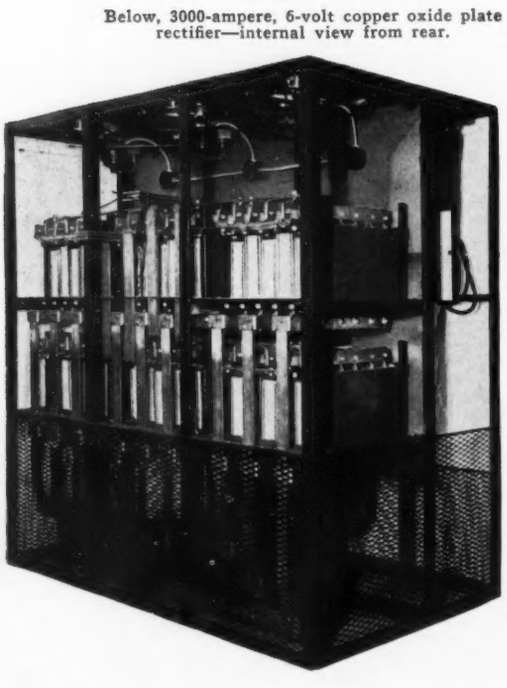


Figure 2

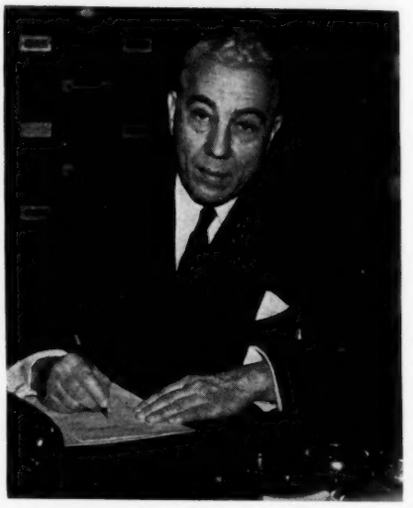
2500-ampere, 600-volt ignitron rectifier.

Figure 3

Below, 3000-ampere, 6-volt copper oxide plate rectifier—internal view from rear.



Electrical Equipment Trends in the Chemical Industry



By C. C. Levey

Petroleum and Chemical Section

Westinghouse Electric & Manufacturing Company.

THE chemical industry uses some of the commonest and most abundant of raw materials—brine, sea water, coal, and limestone—to make products which have an annual value of nearly 4 billion dollars.

Most of the processes by means of which these values are created, would have remained scientific curiosities, or laboratory playthings, had not the inventive and organizing genius of electrical engineers kept step with the brilliant research work of the chemists. In a happy union of the electrical and chemical industries, the one makes possible economical power for the large scale production required by the other.

The use of electrical power in chemical plants is logically classified as:

(1) Generation of primary alternating current power.
(2) Conversion to supply direct current for electrochemical processes.
(3) Distribution of power for motor drives.
(4) Regulation or control by automatic means of plant loads or process.

Statistics issued by the Federal Power Commission indicate that the total amount of electric energy consumed in the chemical industry in 1936 was more than 10 per cent. of the total energy generated by public utilities for all purposes. Slightly more than one-half of the power consumed in the industry was generated by industrial plants, the rest being furnished by public utilities. However, the power used in one industry alone—the aluminum industry—accounts for more than 80 per cent. of the privately generated power, so the industrial generating plant is not as common as statistics seem to show.

Needs of Chemical Industry

The two vital needs of the chemical industry are (1) an abundant supply of cheap power and (2) location of the plant in an area suitable for obtaining raw material and marketing the product. These two needs favor the industrial generating station, because cheap purchased power, that is hydroelectric power, is not located where the second need may be satisfied. Moreover, many chemical processes require large quantities of low-pressure steam. It would therefore be expected that many of them would operate economically by generating steam at high pressures, and passing it through turbines to obtain electrical power as a by-product in addition to process steam. In spite of the apparent advantages of the individual generating plant the trend appears to be to the use of purchased power when a new plant is built. In many instances the plant can be put in a location with convenient access to the public utility generating station, which supplies process steam as well as power. In other cases advantageous rates are obtained because of the 24-hour steady load. Present trends in power generation for chemical plants seem

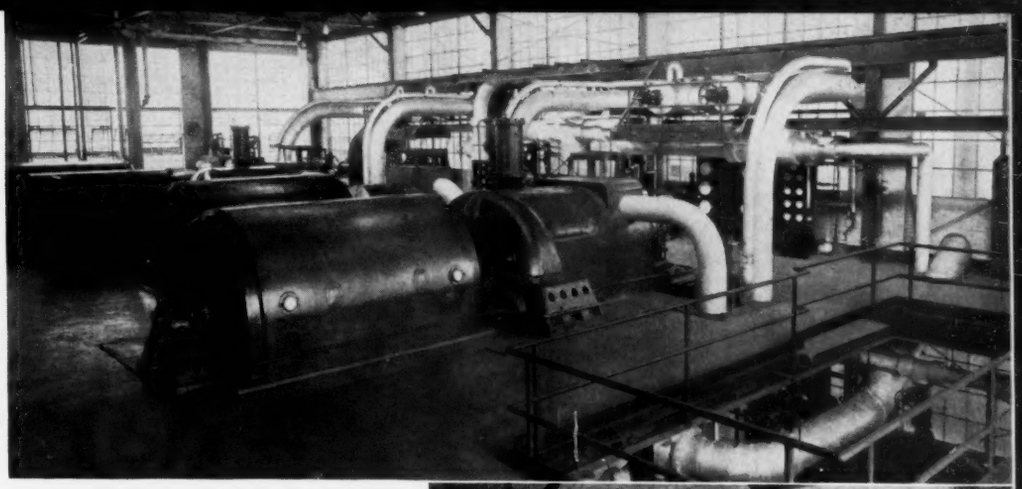


Figure 4

Right, turbine room in a well-known chemical plant.

to indicate that steam pressures will not advance rapidly beyond the present range of 400 to 600 pounds per square inch, and that process steam will be used at the lowest possible pressure so as to get the maximum amount of by-product power. The present tendency to decentralize plant operations will increase. This will either tend to increase efficiencies in smaller generating plants, or it will increase the use of purchased power under favorable conditions. Public utilities will co-operate more closely with chemical plants to give them process steam as well as economical power.

Practically all the energy used for direct as distinct from motorized applications, is obtained by conversion from an alternating-current supply. Conversion units are then the link between the purchased or generated power and the electrochemical cells. There is a connected capacity in the chemical industries of about 900,000 kilowatts in direct-current equipment; 70 per cent. of this total at present is in rotating conversion units (synchronous converters and motor generator sets) and 20 per cent. is in mercury-arc rectifiers and the rest is in direct current turbine driven generators.

Mercury-Arc Rectifier

The most significant development in conversion equipment has been the mercury-arc rectifier. It was applied in the traction field, where its high light-load efficiency and ability to stand momentary overloads were distinct advantages. Its adoption in the electrochemical industries, started in 1934, increased very slowly at first, but has rapidly gathered momentum in recent years. The slow start was due to the lower direct voltages (125 and 250 volts) that have been standard for many years. At 250 volts the initial cost per kilowatt of rectifiers is high, and the efficiency of the tank-type rectifier only slightly better than that of a motor generator set, and not equal to that of a synchronous converter.

Ignitron Rectifier Developed

As results of this situation, operating voltages have been increased and the ignitron rectifier has been developed. The rectifier itself is inherently a current device and therefore cost of conversion for any given job will be decreased if the operating voltage is increased, resulting in a decrease in the amperes to be rectified. To increase the operating voltage it is only necessary to connect more cells in series. This cannot always be done as there are objections by some operators to the use of higher voltages, because of hazard and the necessity for better cell insulation. It is significant, however, that in the manufacture of chlorine, all recent installations have been mercury-arc rectifiers operating at 500 volts or higher, so that the cost per kilowatt of conversion and the efficiency have both profited.

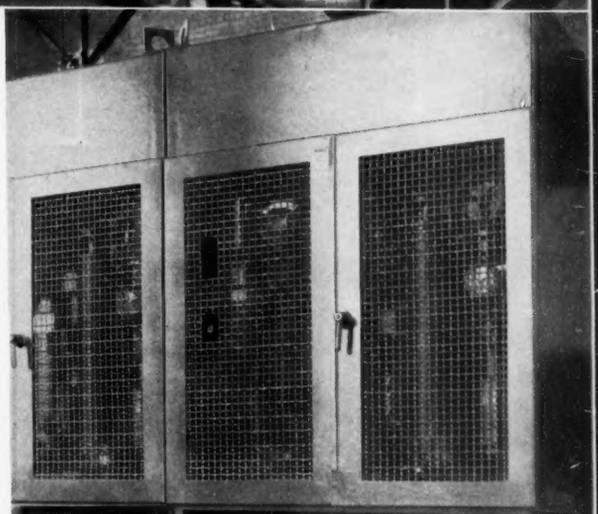
Ignitron Described

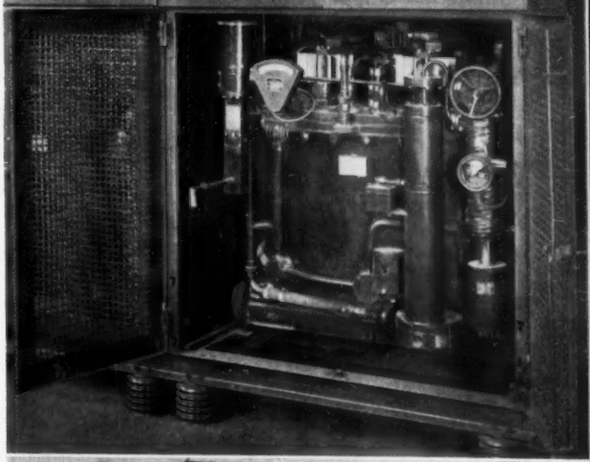
The ignitron is a new type of rectifier in which each anode and cathode is enclosed in an individual evacuated compartment, and which employs an external electronic means for renewing the current-carrying arc in proper sequence at the end of each half cycle. With this type of rectifier higher efficiency and a reliability equal to that of the conventional tank rectifier are obtained. The principles, the construction and successful commercial operation of this rectifier have been covered in recent publications.[1] The illustrations of the two types of rectifiers bring out the difference in construction quite clearly. The curves indicate the efficiency comparison with other conversion units.

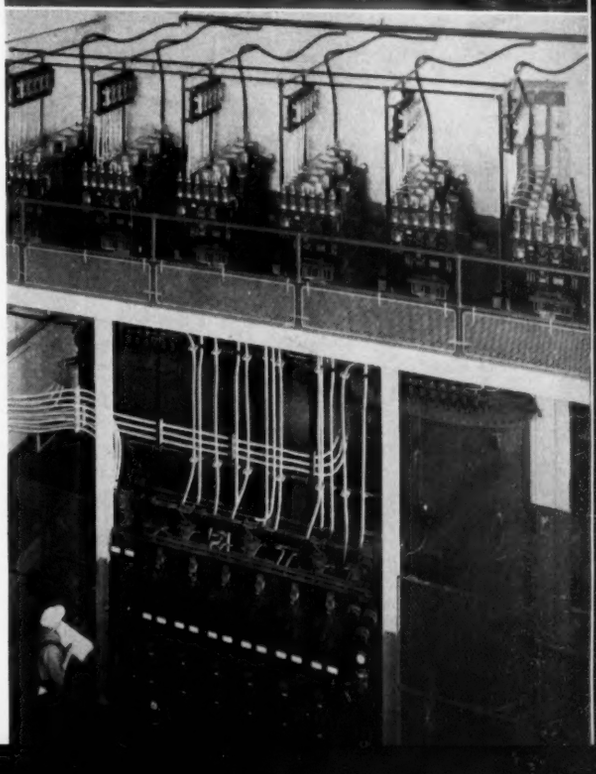
Ideal Conversion Unit

The ideal conversion unit should have the following characteristics:

(1) Reliability
(2) High operating efficiency at full load
(3) Low maintenance
(4) Simplicity and flexibility in operation
(5) Suitability for automatic operation
(6) Freedom from corrosion difficulties

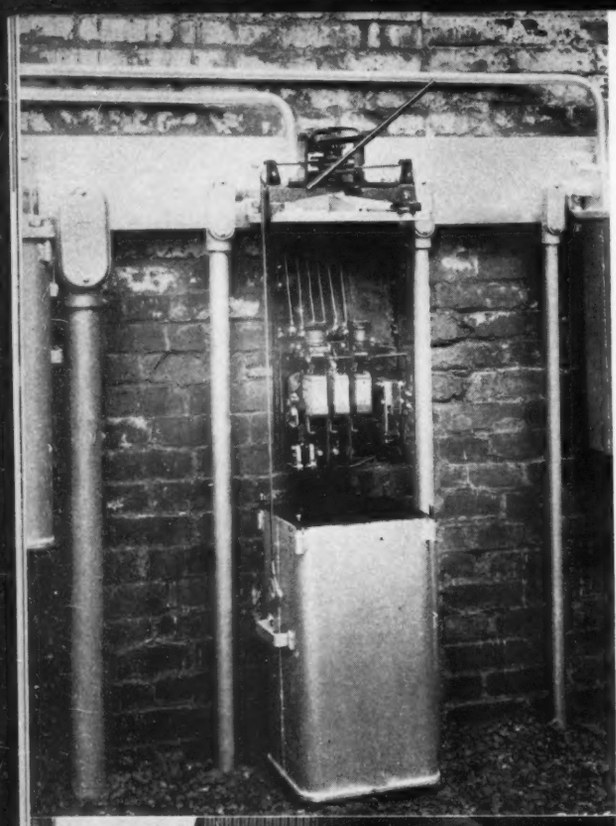


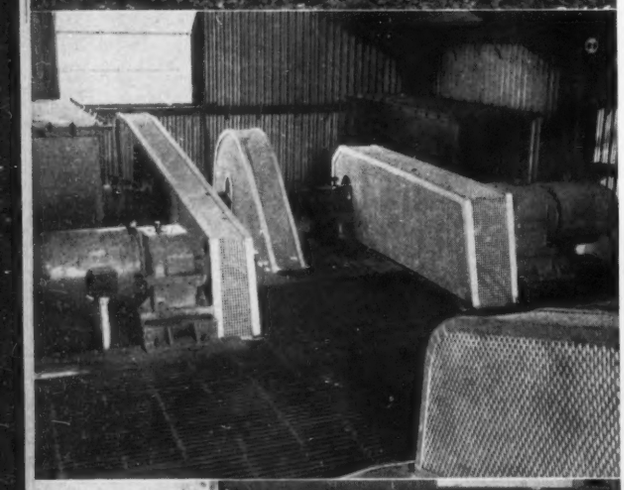


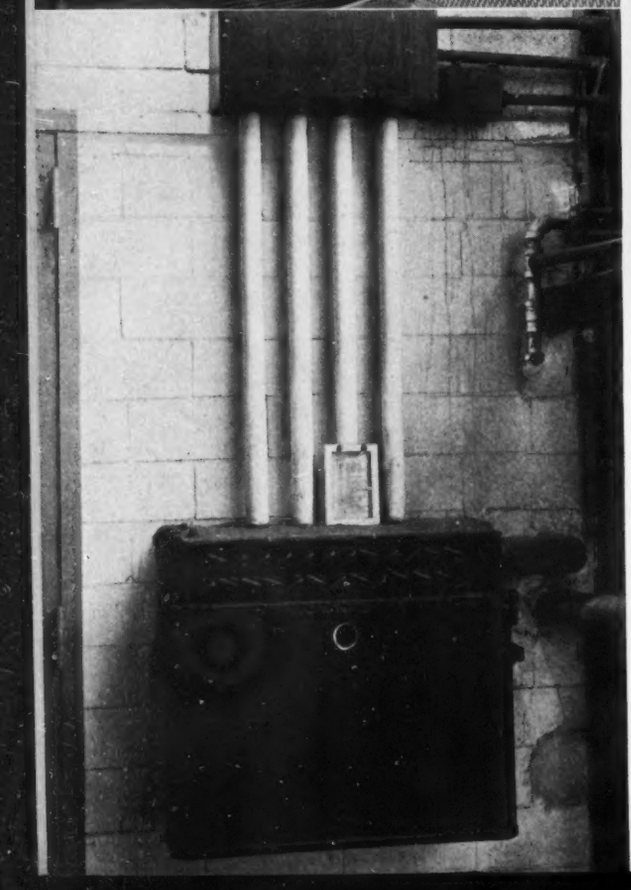


Figures 5 and 6

Right center, 6000-ampere, 500-volt sectional-type multi-anode tank mercury-arc rectifier; below, 4800-ampere, 285-volt ignitron rectifier in an electrochemical plant.







Figures 7, 8 and 9

Left, top, 25-horsepower, low-voltage, oil-immersed full-voltage starter with tank-lowering device; center, totally enclosed fan-cooled gear motor driving elevator in refractory plant; bottom, 24-circuit oil-immersed lighting panelboard installed in a chemical plant.

Mercury-Arc Rectifier

The mercury-arc rectifier, and particularly the ignition rectifier will practically supersede all other types of conversion units, since it more nearly satisfies the requirements of the ideal conversion unit. Even in the very low-voltage field, such as electrogalvanizing, plating, and pickling—applications which are growing in size and importance—another type of rectifier will be used in increasing quantities. This is the copper-oxide rectifier, which has developed from a battery-charging device into a power-supply unit, for applications requiring voltages of from 6 to 12. Installations requiring 2000 and 3000 amperes have been operated successfully and much larger ones are now under consideration.

Corrosive Atmospheres

The equipment for distribution and utilization of energy for motor drives in chemical plants has also adapted itself to unusual and difficult service conditions. The principal enemy to the life of motors and control in chemical plants has been the corrosive nature of the atmospheres. Very early it was found that special insulation was required on motors to withstand the effects of the acid- and alkali-laden air. Bearings must be thoroughly sealed, windings must be protected from splashing and dripping liquids. All these problems have been successfully solved. The tendency to the use of totally enclosed fan-cooled motors with special corrosion-resisting insulation is now marked. Motors of this type with specially constructed frames, so that losses are removed from the internally circulated air by means of ducts cast integrally with the frame through which external cooling air is circulated are shown in figure 8 which also illustrates the advantages of combining motor and speed reducer into one unit called a gearmotor.

Contacts of Switchings

Corrosion attacks the current-carrying contacts of switching and control just as it attacks motor windings. Current-carrying contacts are vital to the proper performance of switching and control equipment. Several methods are used to make contacts safe from troubles due to corrosion:

(1) The use of silver and silver-plated contacts, since silver oxide is a good conductor.

(2) The enclosure of equipment so as to minimize exposure to corrosive atmospheres.

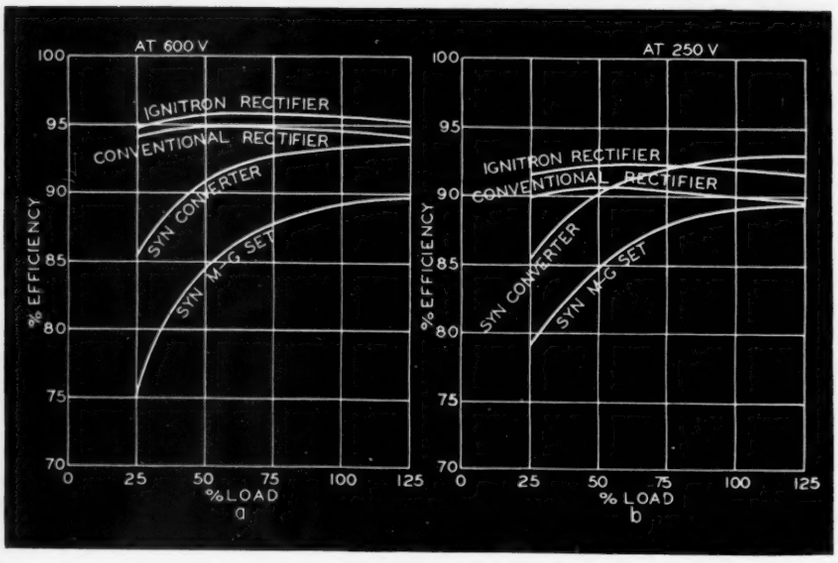


Figure 10

Comparison of typical efficiency curves from 750 KW capacity conversion apparatus.

(3) The use of oil-immersed controls to remove contacts completely from contact with corrosive air.

(4) Location of control equipment in areas where the air is relatively free from corrosion, or which are supplied with clean air.

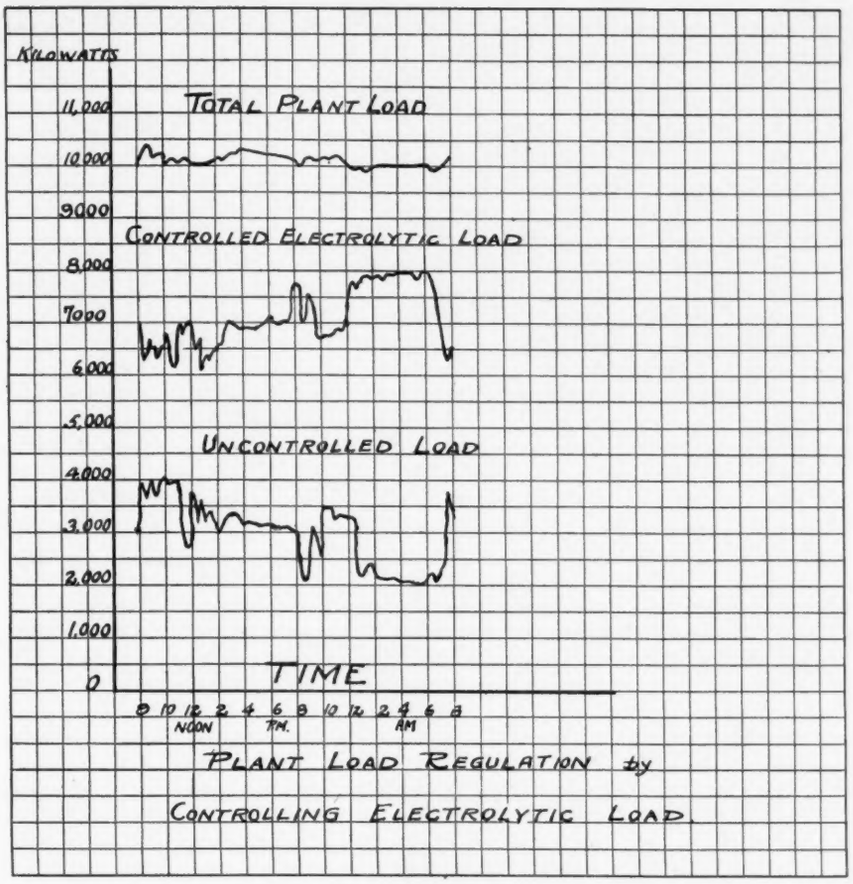


Figure 11

Chart showing plant load regulation by controlling electrolytic load.

Future Equipment Trends

Future trends in equipment for distribution will follow two distinct lines. One will be the use of contacts of silver or special anticorrosion alloys for current-carrying parts, combined with a new type of enclosure illustrated in Figure 1. This type of enclosure has no potential differences across its face but permits the breaker or equipment to be withdrawn readily for inspection and maintenance, with absolutely no hazard to the workman. It also permits interchange with spare units where repairs that cannot be conveniently made on the spot are necessary. This affords a high degree of safety combined with convenience in inspecting contacts, which are specially designed to resist corrosion.

Oil-Immersed Equipment

The other trend will be the use of completely oil-immersed control and switching equipments. This will be perhaps the most satisfactory solution to the problem of corrosion in chemical plants. At present full-voltage and reduced-voltage starters have been widely applied. In the petroleum industry, which is closely allied to the chemical industry, 2300-volt starting equipment, and even incoming line and transfer relaying equipment have all been applied completely oil immersed for outdoor service in explosive atmospheres.

There is a definite trend to process regulation in the chemical industry. When batch processes are converted to continuous processes, automatic regulation becomes increasingly important. Automatic control of such devices as motor-operated valves play an important part in a plant production schedule. Accurate measuring instruments and schemes of control will be increasingly developed with the aid of electrical devices.

Regulation of plant load is not new in chemical plants because electrochemical production is very readily controlled by control of the voltage. When it is important that a certain maximum demand in kilowatts be not exceeded because of its adverse effect on billings, it is general practice to control the load on one or more conversion units, so as to keep the total plant load constant. With sensitive kilowatt regulators available the tendency will be to do this automatically, particularly as rectifier voltage is very simply and easily controlled.

An excellent example of the advantages of such plant load regulation is shown on the graphic chart which illustrates the 24-hour load on the plant in kilowatts. By control of the electrochemical load the peaks and valleys caused by the uncontrolled load are smoothed out so that the total plant load is practically constant.

Special Equipment Designed

Satisfactory electrical equipment has in the past been found for each demand of the chemical industry.

It is certain that future products and processes in the chemical industry will continue to require specially developed electrical apparatus and circuits. Electrical engineers and manufacturers are constantly working on these problems and will not only be ready to furnish the equipment when the chemical industry demands it, but are even now anticipating some of these demands.

[1] A New Method of Initiating the Cathode of an Arc—by Slepian and Ludwig—Trans. A. I. E. E. June, 1933.

The Ignitron—A new mercury arc power converting device—by Jos. Slepian—Trans. Electrochem Soc. Sec. Volume LXIX—1936.

Mercury Arc Rectifiers and Ignitrons—by J. H. Cox and D. E. Marshall—The Electrochemical Society—October 1937.

Low Voltage Rectifiers for Industrial Requirements—by G. E. Stoltz and J. H. Cox, A. I. S. E. convention—Sept. 1938.

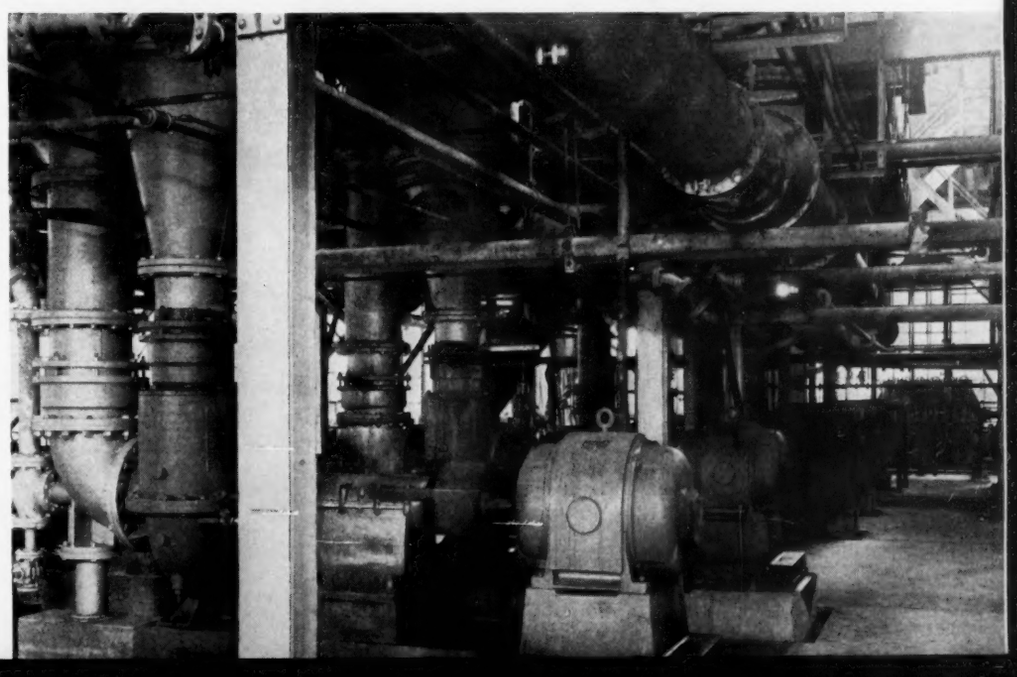
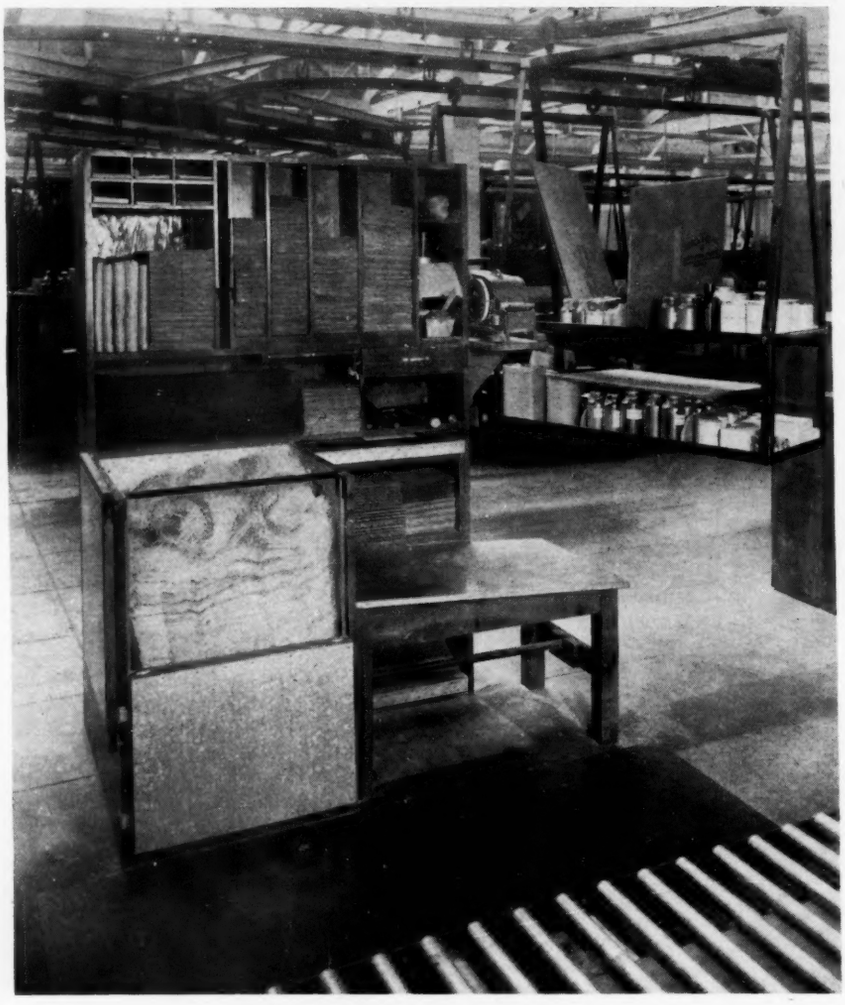


Figure 12

Splash proof motor installation in a chemical plant.

Improved Shipping Department Equipment



By R. M. Cooley

Assistant Manager, Packing and Shipping Division, Merck & Co.

THE commonly accepted meaning of the word "equipment" is too restricted. When applied to the chemical industry, "equipment" probably brings to your mind such devices as fractionating columns, filter presses, packaging machines, electric trucks, or a host of other modern machines that are vital to the manufacture and transportation of your products. Truly, these machines constitute equipment in the ordinary sense of the word, but it has a broader meaning. Let us define it as: "Any material or object that renders an operator better fitted to perform a service."

Turning our thoughts to the shipping department with this definition of equipment in mind, we find that all the old tables, benches, and box carts, common to most shipping departments, definitely fall in the category of equipment. The chances are that, as such, they antedate most of the other equipment in the plant. The manufacturing and office equipment of the same vintage has long since been relegated to antiquity; but a bench is still a bench, and that is all that is needed on which to pack a shipping case—or so operating men too frequently believe.

Our general problem, which is probably applicable to most shipping departments, is to select stock against orders; transport stock to checkers; check accuracy of stock selection; transport stock to packers; pack stock in corrugated or wooden cases; stencil, label, and weigh cases; and assemble cases for shipment by truck or rail.

Our purpose in analyzing the equipment and old methods was to produce a better product (in this instance the packed case) at the right time, at a lower cost.

It should be made clear that all improvements effected in the redesign of equipment were the results of suggestions made by operators, foremen, and the department head on the job. These men had been trained in the principles, rules, and techniques of Work Simplification. Their natural curiosity and intimate knowledge of detail, plus the guiding hand of a staff engineer did the rest.

Stock Transportation

Under the old arrangement four-wheeled shelf trucks were used for transporting selected stock. Orders, received in the shipping department via pneumatic tubes, were placed on trucks drawn from the empty truck storage location. Trucks were then pushed to one end of the storage bins and moved down the main aisle, at right angles to the bin aisles. The stock was selected in alphabetical order. Each stock selector was in charge of one section of bins and when he had filled the order for items in his section, the shelf truck was pushed on to the next. When the last selector had completed the order, he pushed the shelf truck to the checkers, who, after checking the accuracy of selection, pushed it to the packers.

A double line of trucks was kept in the main aisle, the one nearest the bins being the "speed" or "order" line, and the other one the "branch order" or "future shipment" line.

After careful analysis the department head and industrial engineer worked out a monorail carrier system to replace the shelf trucks. This system starts at the dispatch station, where orders are received via pneumatic tube, and moves down the main aisle in a double line. In this way the "speed" and "slow" lines are maintained, but by-pass switching arrangements are provided at frequent points to permit the transfer of carriers from "speed" line to "slow" line, or vice versa, if their status should change or be affected by succeeding orders after they have been put into work. From the end of the storage bins the monorail swings around to the checking unit and from there to the packers. A multiple switching arrangement and the introduction of a third line just ahead of the checking unit permit the separation of mail and express orders which are handled by a separate checker. The three lines thus formed converge, upon leaving the checking unit, at the shaper's station, where the proper size and type box and packing material are put on the carrier with the goods. The monorail then branches into five lines serving ten checkers. After leaving the packing unit the empty trucks converge into one line which returns to the dispatch station. A side line for the temporary storage of empty trucks is provided

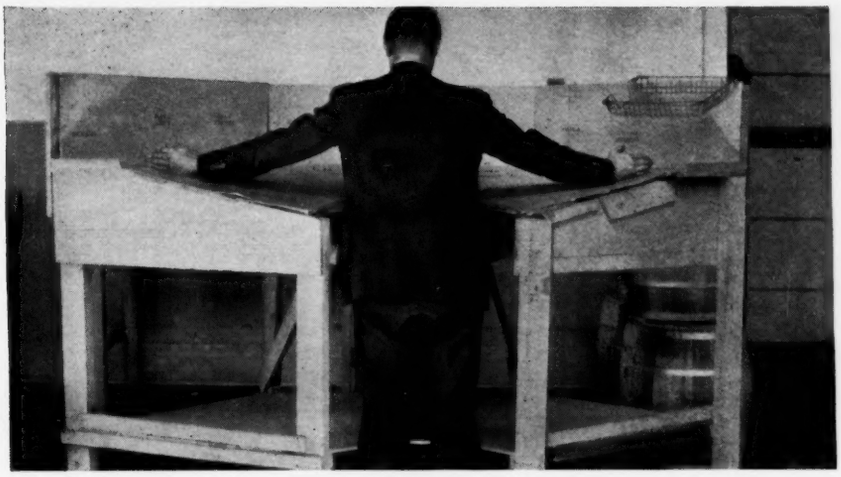


Figure 1

An experimental checker's bench

at this point to take care of the fluctuations in volume.

The numerous advantages realized by the substitution of the monorail system for the shelf trucks were: stock selectors do not have the fatiguing work of pushing trucks from station to station; "speed" line carriers are no longer misplaced in the "slow" line; pushing trucks from checkers to packers and from packers to temporary storage area has been eliminated; much floor space has been cleared; aisles can no longer be blocked; truck "jams" have been eliminated; speed of service has been increased; and the total cost of stock assembly has been decreased.

Stock Selection

Under the old arrangement shelf trucks were usually left in the main aisle, the stock selector walking down the bin aisle to stock location, selecting the goods and carrying them back to the shelf truck, as illustrated in Figure 4. In some cases the shelf truck would be taken down the bin aisle to stock location, but the small quantity of goods generally selected from each location and the narrowness of the aisles (32″ to 40″) usually made this impractical.

Use of "Go-Carts"

Based on an employee's suggestion, the use of "go-carts" in the bin aisles was introduced. These four-wheeled carts are similar in type to those used in the self-service produce markets, and are equipped with two large removable baskets made of wire mesh fine enough to prevent the escape of the smallest size packages. The overall width of the carts is only 18″ so they are easily handled in the narrow aisles. The use of one of these carts is illustrated in Figure 2. Note the fixture hanging from the handle of the cart (shown in raised position) which comprises a pencil holder, production record, and order slip holder.

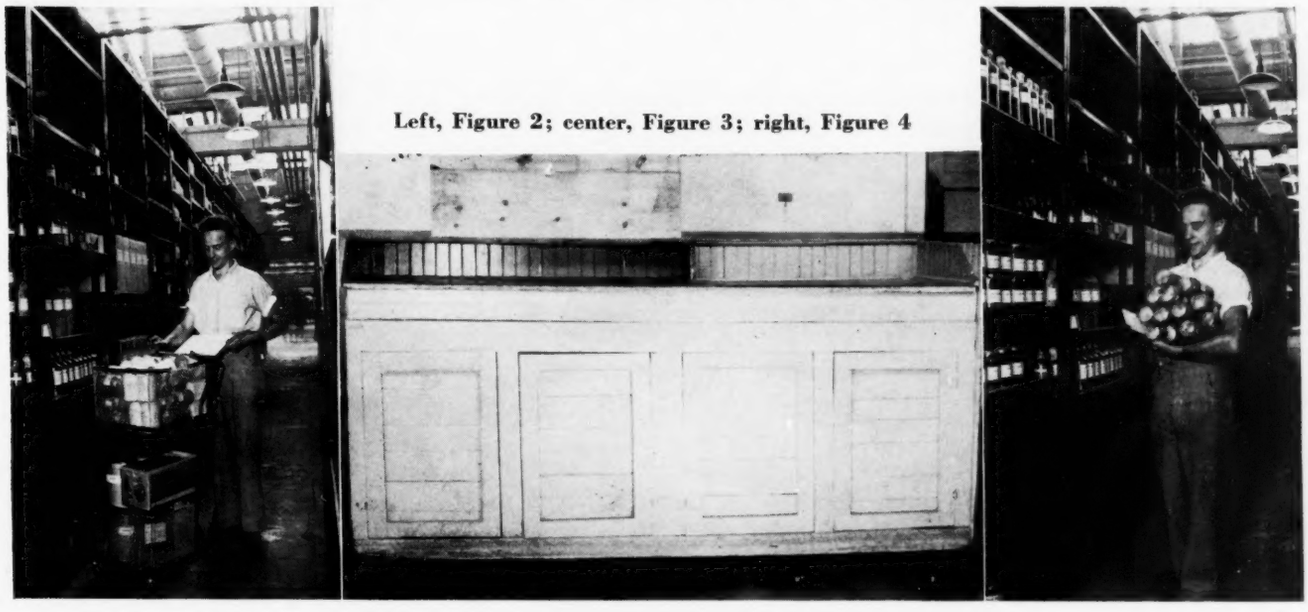
Process-chart and stop-watch analysis indicates a reduction of 50 per cent. in the walking time of stock selectors from monorail carriers to stock bin location. This reduction is made possible because the "go-carts" hold so much more than the usual "armful."

Checking Benches

The old style bench, shown in Figure 3, was the conventional flat top work table about ten feet long. Shipping papers awaiting the arrival of goods and miscellaneous checking equipment such as envelopes, rubber stamps, packing memos, paper clips, rubber bands, etc. were lined up along the back of the bench. Four large storage cabinets under the working surface were used mainly for "junk" depositories. "Short" items, delivered from the Packaging Department for inclusion with the selected stock, cluttered up the working surface of the bench or were put on the floor or on trucks near the bench.

Two basic principles of motion study were incorporated in the design of the new checker's bench: "All material and equipment should be located within the maximum working area; and all material and equipment should be pre-positioned." Figure 1 shows the experimental checker's bench which was built out of scrap lumber. Note the position of the operator, with arms extended, illustrating the application of the first principle of motion study outlined above. Incidentally, it is an interesting fact that the department head was responsible for the conception and development of this bench, unaided by any expert in equipment design.

The finished bench, illustrated in Figure 6, is semi-circular in shape, with individual compartments for pre-positioning shipping papers, envelopes, rubber stamps, packing memos, paper clips, rubber bands, etc. All these compartments are within the maximum working area. A sloping writing surface of convenient height for an operator in a standing posi-



Left, Figure 2; center, Figure 3; right, Figure 4

"Sow the seeds of a healthy discontent with obsolescent equipment—and in the shipping department that probably means present equipment—encourage confidence in the possibility of improvement and welcome suggestions. The results will surprise you. . ."

tion is also provided. The lower shelf offers adequate space for the temporary storage of "shorts" awaiting the arrival of selected stock on the same order.

Advantages claimed for the redesigned workplace are savings of thousands of daily steps required to cover the old area; saving of time due to pre-positioned material; lessening of fatigue through more convenient writing height and position; improved appearance and conservation of floor space.

Packing Benches

The old packing workplace, illustrated in Figure 5, really consisted of three units: packing bench, packing buck, and a loose bale of excelsior. The packing bench was a nine-foot, flat top bench holding a tape machine, glue pots, nail boxes, hammer, stencil brush, stencils, knife, etc. Corrugated hoods, wrappers, pads, and special caution labels were stored along the back edge of the bench. As so frequently is the case, the drawers were almost entirely unnecessary, and only offered the temptation to accumulate trash where it didn't show.

The actual packing was done on the packing buck, and therefore, all the materials on the bench, as well as the loose excelsior bale, were outside the maximum working area. The packing operation performed with this workplace arrangement was aptly described as "a jig from buck to bench, to buck, to bale, and back to buck and bench." At that, this was an understatement, since it overlooked the additional "jig from buck to truck and back to buck." In this instance the problem involved in redesigning the equipment was to combine three pieces of equipment into one, save waste motion, and procure a neater workplace. These aims were achieved in the new packer's bench illustrated on first page of this article. All material and equipment are pre-positioned within the maximum working area. The bench is set at right angles to the monorail line so the carrier hangs a few inches to the right and above the packing buck. This means that goods are transported a minimum distance from truck to box. On the left is a tin-lined excelsior bin, which, in addition to proximity, has the added advantage that it is fire-proof and therefore satisfactory for overnight storage. Under the old arrangement it was necessary to carry all excelsior to a fire-proof vault at night. A compartment for hammer, stencil brush, knife, etc. is above the buck; above this is a drawer for nails and tacks; to the left of this drawer is a holder for the operator's pencil and a sliding shelf for his production record. On the extreme right side of the bench a shelf holds the tape-dispenser; to the left of this shelf a large compartment houses a new style glue-dispenser; then there are four compartments for commonly used corrugated separators, and a small vertical slat for stencils. The extreme left-hand side of the fixture contains material less frequently used, such as large size hoods, long corrugated strips, asbestos pads, and caution labels.

Figure 5

The old packing workplace

The entire overall width of the new bench including the projecting buck is five feet. With no more than one step in either direction, the operator can perform the entire packing operation. The packed case is dropped from the buck onto the belt driven roller-conveyor which passes behind the packer at a height of approximately 8" above the floor. This conveyor carries the case to the scale man and from there it goes to the loading platform.

We have discussed the improvements effected through the redesign of a transportation system, a checker's bench, and a packer's bench.

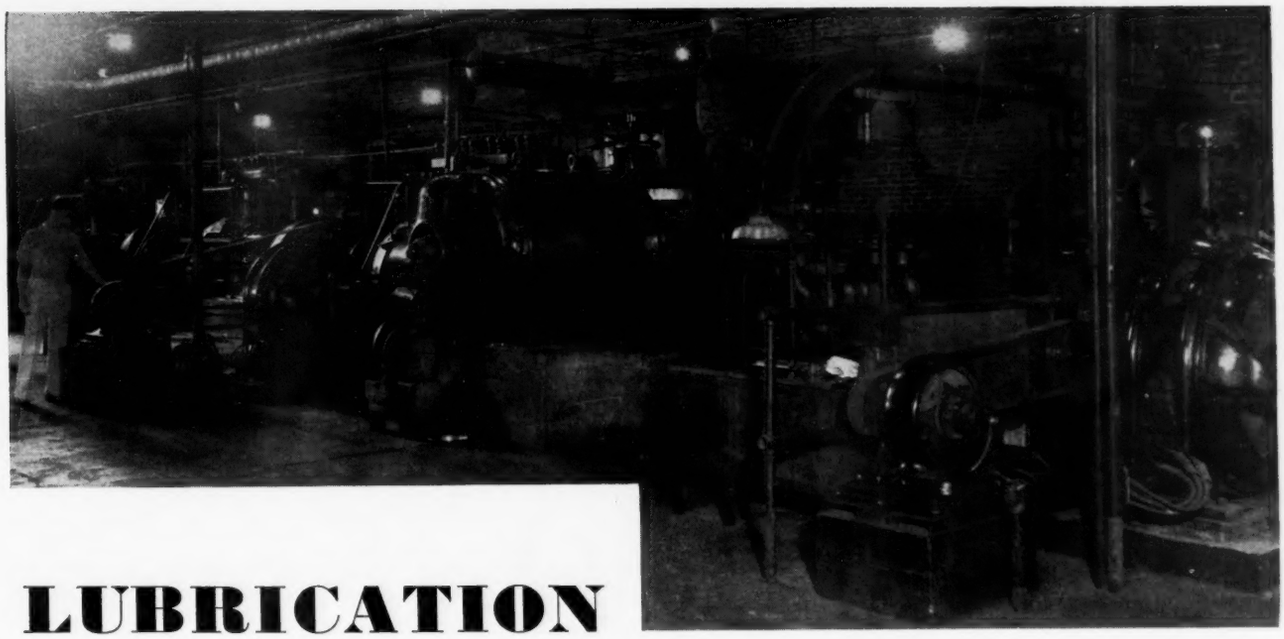
It is evident that the efficiency of a transportation system must be measured by *current* operating conditions. A system that is highly satisfactory at the time of installation will soon become obsolete. The difficulty lies in recognizing the point at which it is obsolete. When a machine reaches its capacity it is obvious, but the only symptoms of an inadequate method of transportation are unnecessary handling, delay and confusion. Even after these conditions are recognized the blame may be placed on personnel, paper work, or fluctuation in volume, when it properly belongs on transportation. We found that we were "sending a boy to do a man's work."

As far as benches are concerned, our experience has convinced us that a bench is not "just a bench." It is, or should be, a carefully designed piece of equipment, planned to meet the *current* operating requirements in as nearly as possible the "one best way." The conception, development, and construction of such equipment is not a difficult task requiring the services of an expert. Any man with a thorough knowledge of operating details, common sense, the rudiments of motion economy, and a spark of ingenuity can design it. Usually any good carpenter can build it cheaply and satisfactorily.

Sow the seeds of a healthy discontent with obsolescent equipment—and in the shipping department that probably means present equipment—encourage confidence in the possibility of improvement and welcome suggestions. The results will surprise you, and when the smoke has cleared away you will find more efficient workplaces, more floor space, better housekeeping, better service, and lower costs.

Figure 6

The finished bench is semi-circular in shape



LUBRICATION

As Part of the Maintenance Program

A Contribution by the Engineering Division of the Esso Marketers

(Standard Oil Company of N. J.)

LUBRICATION of any plant equipment is a vastly different thing today than just a few years ago. Not long ago, lubrication, while recognized as a necessity, was given only the most ordinary consideration. Industrial equipment was different then. Operating problems were largely those of design and construction, and the relation of lubricants to satisfactory operation was small indeed. To what avail a superior lubricant on a shaft which needed frequent replacement because of mechanical breakage? Small wonder then that lubrication requirements were simple, that the traditional combination of red engine oil, cup grease and cylinder oil sufficed. Only the most daring of operating engineers would suggest expenditures under other than emergency conditions for modifications in lubricant application or in the lubricant itself.

Modern Plant Equipment

Modern plant equipment is not so independent of lubrication practice. Modern machinery is built for higher outputs, to withstand heavier loads, to produce more per dollar invested, and with this has come a deeper appreciation of the importance of proper lubrication. Tremendous strides in both lubricants and lubrication systems have been made. Today, industrial equipment operates at costs and service factors considered unbelievable not many years ago. Proper lubrication has assumed a major role in the maintenance program in any well operated, profitable industrial plant. Much research has been conducted and coordinated with practical plant experience. New products have been developed having remarkable properties. Today, though, the major problem seems not the development of new lubricant problems but that of getting existing products to be used properly.

This discussion cannot attempt any consideration of the theory or fundamentals of lubrication. It is concerned primarily with practical plant practices which should be familiar to all plant operators. Simple and straightforward as they are, such practices are all too often overlooked completely amid the maze of other operating problems. Incredible stories could be told of plant lubrication practices which have cost thousands of dollars simply because elementary principles of proper lubrication were not applied. It is these with which this article is concerned, and only passing mention can be made of newer products and newer principles which are being used to solve more intricate problems.

In general, lubricant applications can be divided into two groups—oil lubrication and grease lubrication. Oil lubrication in turn can be classified into points involving (1) hand application, (2) intermittent application, and (3) continuous application.

Oil Lubrication

(1) Hand application is probably the most expensive and least effective of all lubrication methods. Hand application is an inheritance from early practices and cannot be justified today in any vital point unless careful supervision, such as in the case of some marine applications, can be provided. Hand application today should be restricted to points where frequent attention is not imperative. Among such are open gears and bearings, plain journals, minor mechanisms, open ways, and the like. Even in such cases, replacement by some more effective method of applying the lubricant is often justified.

The nature of parts lubricated by hand, which cover a variety of exposed and distant points, often makes necessary different types of lubricants. Proper viscosity of the lubricant is imperative to insure proper flow to the moving part and yet prevent excessive drip. Temperature conditions are important. Viscosities may vary sufficiently between winter and summer to dictate the use of different products for maximum effective-

ness. Pour points are important. Adhesion of the lubricant may be of importance, particularly in the case of shafting, line drives, and the like where high peripheral speeds are involved. Special lubricants are available to greatly minimize the amount of throw-off which may be serious not only from the cost standpoint but also with regard to possible damage to the product being processed. Gears and sliding ways, as well as certain discontinuous operations, have requirements of their own and many special products are recommended. Such products may be necessary because of greater adhesiveness, resistance to shock-loading, resistance to wear, or freedom from corrosion. Many problems may dictate the use of such lubricants, and failure to recognize these problems and take advantage of available possibilities for correction is often an element in high maintenance costs.

Hand Application

The very nature of hand application belies the importance of the operation. After all, hand application is a substitute for other systems which would insure the lubricant reaching the part in adequate quantities. In other words, additional manual attention must substitute for the added investment in lubrication devices. It is imperative with hand application that proper schedules be set up and adhered to which insure that all points receive proper lubrication with sufficient frequency. Where lubricants of specialized properties are used, strict attention should be paid to seeing that such lubricants reach the necessary points. Thorough instruction of personnel is vital. The use of different size or shape oil containers or the use of matching colors of oil holes and containers should be given consideration. Accessibility of lubricant is important and separate small stores of lubricant for nearby hand-oiled equipment are sometimes desirable.

Routine maintenance of hand-oiled points must be followed if satisfactory results are to be obtained. All such equipment should be inspected regularly to make certain that oil holes and passages are open and clean, that adequate but not excessive quantities of lubricant are being supplied, that dirt or chemicals from the atmosphere are not collecting and destroying the effectiveness of the lubricant. Attention should be paid to cleanliness. Exposed journals, gears and ways should be wiped clean regularly and fresh lubricant applied. Only in this way can abrasive dust or corrosive chemicals be removed. Fittings should be wiped clean and kept clean. Drips should be investigated and eliminated if possible. Routine examination will frequently show the need for improved lubricating devices, changes in the type of lubricant, or changes in the lubrication schedule.

Many Mechanical Systems

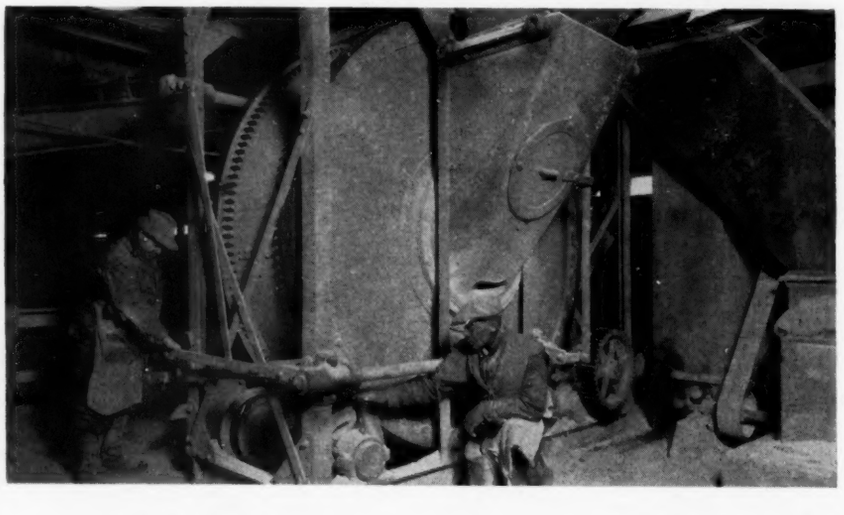
(2) Intermittent Applications: Far more effective than hand application are the many mechanical systems where an intermittent application of the lubricant is used. Familiar examples are wick feeds, drip cups, atomizers, mechanical and hydrostatic lubricators. Such equipment eliminates the unreliability of manual application of lubricant and permits the establishment of much more satisfactory lubrication practices. The much greater variety and complexity of equipment lubricated by such devices involves an extremely broad range of lubricants for best results. Such systems, involving once-through application of the lubricant, have quite different requirements from those of devices involving continuous application, which will be considered later. While, in the case of drip cups or sight feeders, lubricants similar to those for hand application are often satisfactory, in the case of atomizers and mechanical lubricators the problem is usually one involving mixing or contamination with another working medium such as steam, air or gas. Lubrication of steam engines by compounded steam cylinder oils is, of course, well known both by the hydrostatic sight feed types as well as the mechanical injection types. Considerations of steam pressure, temperature and any subsequent process use of steam are important, however, and many modern lubricants have been developed to meet the unspectacular but steady improvement in steam engine practices. Air compressor lubrication has received a fair share of attention and should no longer be serious except under specialized conditions. Lubrication of pneumatic equipment, such as air engines, hammers and turbines, presents conditions for which many new, more effective lubricants have been made available.

The lubrication of gas compressor cylinders, particularly those handling corrosive or chemically active gases under abnormal pressure and temperature conditions, has presented many lubrication problems. Much of such equipment, of course, is not lubricated at all because of the incompatibility of present lubricants with the media being compressed. However, developments have progressed in this field and there are now combinations of compounded lubricant with various emulsifying agents to improve lubrication and reduce corrosion and wear under many difficult conditions. Where such equipment is operated at very low temperatures, lubricants of particular, low-temperature properties are necessary. All of such applications are specialized in nature and the attempt to eliminate or minimize special lubricants merely for the purposes of simplicity may be a costly operating practice.

Intermittent Type

Proper maintenance of lubrication equipment of the intermittent type is again of importance and is often overlooked. Wicks should be cleaned occasionally and precautions exercised to prevent contamination from compounded lubricants. Drip feeders and mechanical lubricators should be checked regularly to insure proper feed rates and proper distribution to all points supplied. Care should be taken that atomizers are installed properly in air, steam or gas lines and that this is not subsequently disturbed. Periodic inspection of their condition as affected by vibration, corrosion, erosion or plugging should be made to insure that the lubricant is feeding properly through the atomizing device. Cylinders lubricated mechanically should be inspected to be certain that the lubricant is being applied at proper points. Relocation of the points of application may be important, or different grades or

The lubrication of mixing and grinding equipment is extremely important



types of lubricant may be desirable in order to accomplish better coverage.

(3) Continuous Application: Continuous application of lubricant involves a wide range of operations where the same lubricant is continuously re-used, either by bath or circulating systems. Familiar examples of both systems are those of engine crankcases, gear case sumps, spindles, ring, chain, and collar oilers. These systems present entirely different problems for the lubricant than in the case of once-through applications. Stability requirements, for example, of little consequence in the once-through types, are vitally important in oil baths. Contamination of the lubricant with process or external materials may be of tremendous seriousness, and protection against this by means of seals or hoods frequently is necessary. Contamination of some types of lubricants with many chemicals can completely ruin a circulating system within a few days. Proper lubricants can resist such conditions and greatly minimize operating problems.

Critical Viscosity Requirements

Many of these applications involve rather critical viscosity requirements, such as in the case of ring oilers and gear trains where the lubricant is carried up on the moving surfaces, and changes in viscosity of the lubricant may seriously affect the supply. Intermittently-operated or exposed equipment may involve temperature limitations on the lubricant and dictate requirements of minimum change inconsistency within the operating temperature range. Sludge or sediment formation may be serious and the highest quality lubricants are often required in the apparently simple reservoir types. Corrosion by the lubricant due either to deterioration or contamination is often of importance.

Circulating types of continuous lubrication systems are the outgrowth of the most modern lubricant developments. Circulating systems have been long familiar on prime movers, such as steam turbines, diesel engines and bearing lubrication of reciprocating engines. This type of system is being extended rapidly to an increasing number of applications. Lubricant is supplied in adequate quantities at the temperature and viscosity desired. The lubricant then is collected and returned to a common point where moisture or other contamination is removed, dirt or metal particles can be separated, various cleaning devices such as filters and centrifuges can be used, all of which restore the oil to its initial condition. The oil can then be cooled and circulated again, thus performing its lubricating function with a maximum of efficiency. Circulating systems are finding increasing use in paper mills, steel mills, and other equipment involving a large number of reasonably similar parts to be lubricated with a continuous oil bath.

Great strides have been made in lubricants for circulating systems. With lubricants installed in clean systems and maintained properly, extremely long service periods of the lubricant, often exceeding 50,000 hours, are possible together with the maximum freedom from lubrication difficulties. Such lubricants must have not only extreme stability under the particular conditions of operation; they must not be affected by a wide variety of metals, must be highly resistant to contamination by moisture or other common materials, and must not have or develop at any time corrosive properties to any of the equipment through which they are circulating. Much of the success of modern circulating systems is due to the development of lubricants having exceptional characteristics for this purpose. Many of these systems would be seriously jeopardized by the use of lubricants which carry or develop deposits which might be separated in remote parts of the system and necessitate complete dismantling in order to restore the lubricant circulation.

All continuous systems should have established a regular routine method of maintenance. Sumps and reservoirs should be inspected regularly and drained, cleaned and refilled with fresh lubricant whenever necessary. In circulating systems, routine inspections should be made of the lubricant so as to protect against any ultimate breakdown. When the end of the useful life of the lubricant approaches, the lubricants should be withdrawn and replaced so as to prevent any rapid accumulation and precipitation of sludge or other materials which would necessitate costly cleaning.

Grease Lubrication

Grease lubrication in general is used where an oil cannot be retained satisfactorily under the particular conditions of design or operation. Grease applications are, generally speaking, much older and much more widely used than oil applications because of the relative simplicity in the use of grease. However, this simplicity is a dangerous one. As a matter of fact, proper lubrication by grease may involve even greater care than for equivalent lubrication by oil.

Essentially, a grease is merely a sponge of soap holding in its interstices the lubricant desired. This consistency or matrix supplants other mechanical provisions for the retention of oil in the lubricated part and permits the oil to be squeezed out gradually. The properties of a grease involve lubricating properties of the oil, any compounding effect of the soap, and retention of the soap matrix used.

Important to remember is that grease properties are thus a combination of a number of individual characteristics, any one of which may be vital to any particular application. For example, moisture has a pronounced effect on many greases and a grease which would be extremely satisfactory under any other circumstances may fail entirely in the presence of even small amounts of moisture. All greases have critical temperature ranges in which their operating characteristics are most desirable. Changes up or down in temperature may cause complete failure of such greases and require the use of other grease which, by the familiar eye, nose and "thumb and finger" tests, might seem much less suitable. Mechanical working has an important effect on grease structure. Some greases, entirely satisfactory for some applications, may be quite unsuited to other applications, such as anti-friction bearings, where mechanical working is a large factor. All of these properties must be considered in the application of grease in any lubricating problem. For convenience, grease lubrication can be classified by the method of use into (1) hand application and (2) continuous application.

(1) Hand Application: Hand application of grease is still widely used and is familiar to most operating men in the form of the grease paddle and bucket. Block and yarn type greases are also applied by hand. While not strictly hand applications, the familiar screw cup and pressure fitting can be classified as such. Such application methods are often satisfactory but in many cases leave much to be asked.

Several Types of Grease

In practically all plants, several types of grease are necessary for hand application, such as, for example, those suitable for high temperatures and those suitable for low temperatures and the presence of moisture. For satisfactory service, these greases must be segregated, and good practice is to have all grease-dispensing containers covered and prominently marked or colored for the different greases in order to guard against the wrong grease being used. Different type pressure fittings and guns should be used as a further precaution against inadvertent misapplication.

As in the case of oil lubrication, satisfactory lubrication by hand application of greases is dependent upon a proper routine procedure for greasing and maintenance. The proper types and proper frequency of greasing should be established at each point. In cases where such routine attention cannot be or is not given, the substitution of more satisfactory application devices is thoroughly justified.

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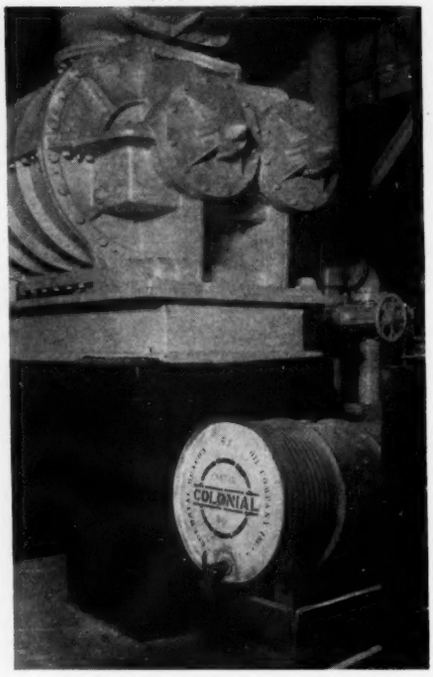
The maintenance of grease-lubricating equipment is of importance as great as, if not greater than, that for oil. The mere appearance of grease at the outlet of a fitting is no indication that adequate grease is present. Lubricant passages may be plugged or excessive wear may have taken place so as to permit complete by-passing of the most important part. All such equipment should be dismantled and inspected regularly and lubricant passages cleaned to be certain that they are in proper operating condition. The presence of dirt or other abrasives in the air or the presence of chemical contaminants should be observed carefully and pains taken to see that grease does not carry these materials into the lubricated part. Grease fittings should be wiped carefully clean before the gun is applied and the extruded grease should be removed. The presence of grease on the exterior of a fitting is a snare to any contaminant in the atmosphere and once present such contaminants inevitably find their way into the working part. In some cases, the danger of contamination from ambient abrasives is so great as to make highly desirable the application of continuous grease lubricators which, by providing a steady flow of grease, prevent any of the contaminants entering the working parts.

(2) Continuous Application: Most continuous grease application is by means of spring-loaded pressure fittings. There is a growing trend, however, to the use of pressure grease systems which distribute grease to a number of points from a centrally located reservoir. Such systems, of course, impose special requirements on the grease itself in order to insure proper flow. Freedom from development of any lumps or other materials which may impede the flow of the grease through the distributing line is necessary. On occasion, the requirements of the dispensing equipment are not consistent with the requirements of the lubricated parts, in which case either a compromise is necessary or some redesign of the grease dispensing equipment is desirable.

Continuous Application

Continuous grease application has the advantage of regular supply of the lubricant. It has the further advantage of insuring the presence of lubricant at all times and the replacement of used grease with fresh product so that adequate lubrication is always available. Still further advantages already mentioned are those of purging of the equipment so as to prevent entrance of ambient contamination. Such devices are also desirable in places where operation in the presence of moisture or other liquids is a problem. Some temperature and pressure conditions are so rapidly destructive to greases that continuous feed of the grease by such devices is necessary.



Plant lubrication must be considered as a series of individual lubrication problems.

Maintenance of continuous grease lubricating systems is of importance equal to that of any other device used. Routine inspections should be made to be sure that working pressures are maintained, that springs and follower plates are seated and properly operating, that lubricant passages are free, and that all points to which grease is distributed are receiving the lubricant in the proper amounts. Drips and excessive consumption of grease should be avoided not only for reasons of cost but in order to prevent contamination of products processed and to minimize danger to personnel.

Grease reservoirs subjected to unusual conditions of temperature or pressure should be inspected occasionally, since some greases after extended conditions of pressure or temperature tend to separate soap from oil. The oil is lost rapidly and the soap remaining is not only ineffective as a lubricant but has the hazard of possible serious plugging of the lubricant passages.

Special Lubricant Products

While the foregoing discussion covers the majority of the normal lubricant applications encountered, there are occasions where special products of unusual characteristics may be of interest and contribute to the solution of costly problems.

Chemical agents have been developed for addition to lubricating oils and greases to impart extreme pressure properties. By judicious use of such materials, the so-called "load-bearing" properties of lubricants is greatly increased, and in applications where severe abrasion or shock is involved life of equipment can often be extended considerably by the use of this type of lubricant. Such lubricants are normal in all other respects and have a wide range of application where their added cost is justified.

Certain specialized applications, such as hydraulic controls and hydraulic systems in general, use with great advantage lubricants having very low change of viscosity with temperature, exceptional stability, and resistance to foaming. During recent years, lubricants having extraordinary properties in these respects have been developed and are available for many process uses.

Specialized types of lubricants are available passing pharmacopoeia requirements for use in food and beverage industries. Other specialized types of lubricants have particular resistance to acids or alkalies for use in applications where contact with such chemicals is unavoidable. Other greases have been developed which are resistant to gasoline and other petroleum solvents.

While not strictly lubricants, products such as transformer oils and rust preventives are often classified in this category and enormous progress has been made in these fields in recent years. In the field of rust preventives, compounded petroleum lubricants make possible great extension in the service life of materials subject to corrosion.

In this discussion, it obviously has been impossible to cover in detail any of the properties or composition of even the commonest lubricant products, and the desire has been more to outline the proper use of these products and the service which can be expected.

Plant lubrication must be considered as a series of individual lubrication problems. Each has its own particular requirement and at any one time each is served best by one combination of lubricant and lubrication method. Obviously, every application in the plant cannot accomplish this ultimate, and the result is a compromise which should give optimum economy. A well-lubricated plant should involve thorough understanding between the equipment manufacturer, the equipment operator and the lubricant supplier. All too often, lubricant applications are forced by particular design conditions or operating practices which would not have existed were a broad view taken initially of the entire lubrication problem.

Lubrication can properly be classified as of major importance in any operation. It merits careful consideration by competent men, and lubricant products and practices, once decided upon, should be followed closely not only to insure maximum benefit from such procedures but also to point the way to further improvement.

"Headliners" In the News

T. S. Grasselli, who retires from membership of the Du Pont executive committee on Nov. 14 (his 65th birthday). He will continue as a vice-president and director of the company. He started his business career in 1893 with Grasselli Chemical, founded by his grandfather, Eugene Ramiro Grasselli.

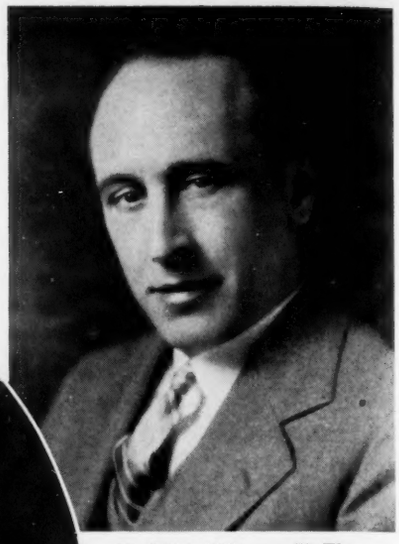
Dr. George W. Carver, famed Southern chemist, who is one of three men to get the Theodore Roosevelt medal this year. Son of slave parents as a boy he was swapped for a race horse.

Below, Harold G. Wolfram of the Porcelain Enamel and Manufacturing Co., Baltimore, who has been elected a vice-president. Mr. Wolfram has been with Pemco for the past fifteen years and has served as laboratory technician, Director of Research, and more recently as Factory Manager. In his new position he will have charge of all engineering and technical activities of the Company.

Right, Gano Dunn, president of the J. G. White Engineering Corp., and of Cooper Union, has been chosen as the 1939 recipient of the Hoover Medal, "awarded by engineers to a fellow engineer for distinguished public service," it is announced by John V. W. Reynders of New York, chairman of a board of award representing the four national societies of civil, mining and metallurgical, mechanical, and electrical engineers.

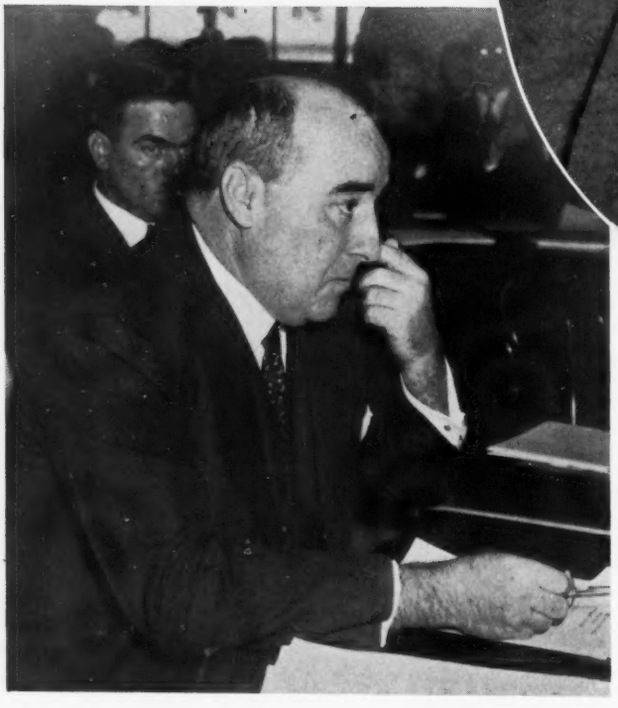
Dr. Charles M. A. Stine, Du Pont vice-president in charge of research, will receive the Perkin Medal of the Society of Chemical Industry for 1940. Presentation will be made at the Chemists' Club on Jan. 12.

Dr. John M. Nelson, Columbia professor of organic chemistry, who will receive the William H. Nichols Medal of the N.Y.A.C.S. Section, on March 8.



De Witt ("Tommy") Thompson, Mathieson Alkali, nominated for the presidency of the Salesmen's Association.

Charles Lichtenberg, vice-president and sales manager, Resinox Corp., Monsanto subsidiary, who has been appointed sales manager of all plastics molding materials produced by the company. He will have headquarters at Springfield, Mass.



Dr. Robert E. Wilson, president, Pan American Petroleum, very much in the "spotlight" at the moment. He received the Chemical Industry Medal on Nov. 10. Above, he is shown as a witness before the "Monopoly Investigating Committee" last month.

C. S. Patton, newly appointed sales manager, Alco Products Division, American Locomotive. This division makes a varied line of chemical equipment.

Lewis H. Brown, president, Johns-Manville, named by the Franklin Institute as the first recipient of the Vermilye Medal—awarded for "his brilliant work in executive management in industry."

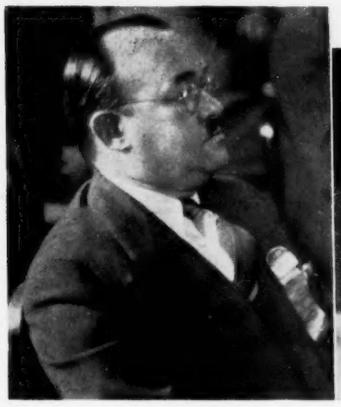
National Pest Control Group Meets in New York

Record attendance marked annual meeting of the National Pest Control Association at the Hotel Pennsylvania, Oct. 23-25. Above, the main hall with the booths of the supply houses.

Above, L. L. Lehritter, American Cyanamid & Chemical, discusses Cyanogas and Zyklon Discoids with visitors.

Below, H. G. Irving Sameth, the '38-'39 president; to the right, below, Dr. R. C. Roark, well-known government expert on insecticides, who spoke on "Importance of Chemistry In Pest Control."

Left, William O. Buettner, secretary of the Association. Below, J. L. Hopkins, president, J. L. Hopkins & Co., N. Y. City.



Left, John Powell, president, John Powell & Co., N. Y. City.

Left, S. B. Penick & Co., N. Y. City, gives an effective display on pyrethrum; right, C. C. Johnson (center) Innis, Speiden & Co., N. Y. City, discusses the advantages of "Larvacide" for fumigation of buildings, etc.

S.B. PENICK & CO.
CHEMICAL ASSAY OF PYRETHRUM FLOWERS
Seil Modification of the Tattersfield Acid Method
For the estimation of Pyrethrins I and II

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Chemists' Club Symposium

The "Symposiarchs" at their first fall meeting of the season hear prominent speakers discuss "Central Europe: Its Capacity For War."

Above, Miss Antoine Strassman, aviatrix and consultant to the aviation industry, who spoke on the German air fleet; Dr. Walter S. Landis, Cyanamid, who acted as chairman; Right, Dr. J. William Scott, Socony-Vacuum, who discussed the political and economic status of the Central European powers. The meeting attracted a record crowd to the Club.

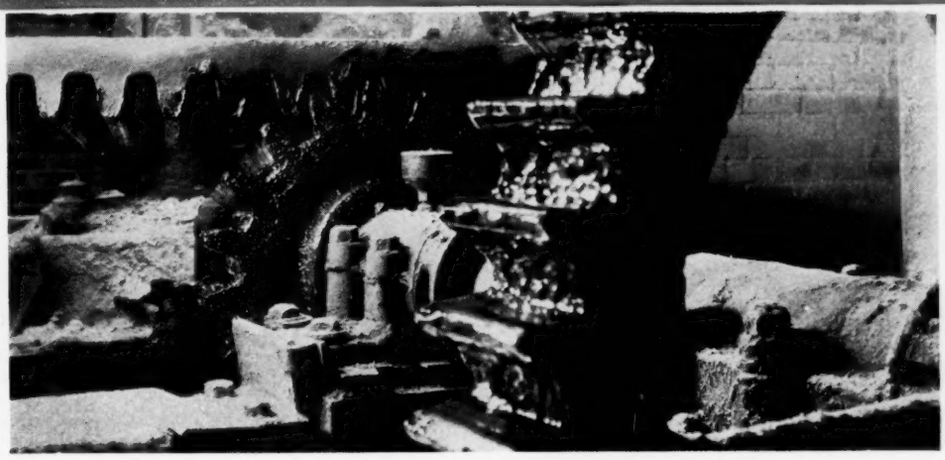
Dr. Benjamin T. Brooks, consultant, who discussed petroleum resources of Germany.

Among those present at the meeting "caught by the candid camera"—Left, E. A. VanValkenburgh, right, Dr. Joseph Ebert; to the right, Mrs. D. H. Killeffer.

Above, Mrs. Walter S. Landis; also Nelson Littell, patent attorney, and Prof. Arthur W. Hixson, Columbia University.

At the left, William "Bill" W. Winship and Louis P. Hammett, Columbia, new chairman of the N. Y. Section of the A.C.S. Right, E. F. "Ned" Brundage, Michigan Alkali.

PLANT MAINTENANCE



Lubrication plays an important part in maintenance. Gears, operating a furnace at the Merrimac Division plant of Monsanto's, Everett, Mass.

Keeping Equipment Off the "Sick-List"

- **Lubrication**
- **Electrical Equipment**
- **Filter Presses**
- **Chemical Stoneware**
- **Grinding Equipment**
- **Mixing Equipment**
- **Glass Lined Vessels**

The expression "Plant Maintenance" to many may imply simply a host of disagreeable and relatively unimportant routine tasks. This is usually true where maintenance and emergency repairs are generally synonymous. In well-managed chemical plants maintenance is merely a mixture of foresightedness and good housekeeping.

Careful thought should be given to the original design and the placing of equipment in its relation to the ever-present problem of inspection, repair, and general maintenance. Previous experiences should be looked into as a guide for the future. Closer cooperation between equipment manufacturer and company engineers should and can eliminate many faults that appear too often only after equipment has been placed in operation.

Larger chemical companies have long since found that plant maintenance is not a responsibility to be lightly turned over to some poorly-trained subordinate. Definitely the responsibility for proper maintenance of a chemical plant rests with the plant manager or superintendent. Even where he can delegate the responsibility to a trained engineer—a specialist in keeping both buildings and equipment off the "sick-list" and relatively free of expensive repairs—he should never relax his supervisory position. You can usually tell the type of plant manager by the housekeeping his plant receives.

Care and MAINTENANCE *of* Grinding and Pulverizing Equipment

By G. F. Metz
District Manager
Hardinge Company

WITH the increasing use of automatic control devices for grinding and mixing equipment, there has been a tendency in a great many plants to neglect these machines, with the result that ultimate failure frequently causes considerable loss to the user. It is advisable then to point out some of the common points of trouble and how to avoid them by the simple expedient of ordinary care and attention.

Grinding and pulverizing machinery as used in the chemical industry is usually either of the slow speed ball or pebble mill type, or of the high speed ring roll, ring and ball or hammer type. Mixers may be of the conveyor, muller and pan or batch pebble mill type.

Proper Lubrication

One of the usual causes of trouble is the lack of proper lubrication, caused either by clogging of the supply line to and from parts to be lubricated, or the use of improper lubricants. Most of the large oil companies now maintain a staff of competent lubricating engineers and also cooperate with manufacturers of machinery to see that the proper lubricant is supplied for all bearings and gears. All reliable manufacturers of grinding and mixing machinery supply specific instructions on the lubrication of moving parts, and also on the proper method of operation, but too frequently these instructions never reach the operator and he is left to his own ideas as to proper lubrication and operation. It is essential that manufacturers' instructions be placed in the hands of the operators of their machines.

Ball and pebble mills are simple machines, usually capable of withstanding considerable abuse. However, if such mills are left to operate at long intervals without feed, excessive lining and grinding media wear is the result. Periodic inspection of the linings of these mills is necessary to prevent major damage to the mill shell. Gears and pinions should be properly aligned and care taken that pinion teeth do not bottom on gears. Gears and pinions should be kept free of dust and lubricated with a crater compound, gear shield or other recommended lubricant. Periodic tightening of lining bolts will prevent liner breakage.

Keep Out Dust

Main bearings should be properly lubricated and here again it is essential to keep out dust. A scored trunnion is usually a major repair item, whereas the rebabbitting of a main bearing is a comparatively simple task. Usually it is well to keep a spare babbitted main and countershaft bearing on hand, so that the minimum time will be lost in making the repairs.

In the event that a mill is shut down for long periods, the operator should remove the ball or pebble charge and thoroughly clean the inside of the mill. An occasional coat of shop paint is desirable and will prevent rusting of parts. Gears, pinions and bearings should be thoroughly cleaned and new oil and grease applied. Worn pinions should be replaced so as to insure long life of the main gear. Some designs provide for the reversing of gears and pinions, thus prolonging their life. Occasionally the accumulated dust should be blown off the entire mill with compressed air. The motors used to drive these mills should be cleaned and inspected at least once a week.

Impact Type of Mills

Roller and impact type mills are usually arranged with air separation equipment, either as an integral or separate unit. As these mills operate at higher speeds than the ball or pebble mills, careful attention should be given to lubrication. A comparatively heavy oil should be used in the roller journals and thrust bearings. When heated air or hot gases are introduced into the mill air circuit for drying while pulverizing, a heavier than usual grade of oil should be used on the aforementioned parts. If mills are operated without heated air or gases and in cold weather, a light grade of oil is recommended. On some high speed mills, forced lubrication of the automatic type is desirable and the higher cost justified. Badly worn rollers, balls and die-rings should be replaced in order to maintain maximum grinding efficiency. The same is true of impact mills employing the swing hammer principle.

Worn hammers are indicated if there is a drop in capacity or if the product becomes coarser. Replacement of worn parts will also prevent vibration and subsequent damage to other parts. Both roller and hammer mills should be opened occasionally and all accumulated tramp iron should be removed.

Exhaust Fan Blades

Exhaust fan blades on all mills of either roll, ball or pebble type, employing air separation as a unit with the mill, should be inspected periodically for wear and worn blades replaced. This is particularly necessary where material passes through the fan. In making this change the wheel should be properly balanced before the fan is placed in operation. Periodic inspection of piping, joints and air locks is advised. If leaks are found they should be stopped by the renewal of parts or patching with roofing cement. Vents should be occasionally inspected to see that they are entirely clear. If partially clogged, they should be removed and cleaned. Where vents are connected to bag or cloth screen collectors, a by-pass pipe should be installed, so that air pressure on the vent collectors can be relieved when "rapping down" the collector.

In connection with replacement parts, it is well to obtain these from the supplier of the original machine, rather than to have them made up by a local shop or foundry. While the price of these parts may be higher, it is an established fact that manufacturers have, in most cases, spent considerable time and money in developing satisfactory materials for wearing parts. Money saved in first cost by replacing worn parts made in local shops, in a good many cases results in a greater final cost, due to inferior material, improper fitting of parts and the possible damage to other parts as the result of the installation of inferior repair parts. The majority of manufacturers have so many different designs, it is impossible to maintain a complete stock of replacements. The user should anticipate his repair needs well in advance of the time that the parts are required.

Operate First Empty

The purpose of mixing machines is to accomplish a mixing or blending process and therefore, the integral design of all parts should be maintained in proper relation with each other, so as to obtain highest efficiency from the equipment. Before such a machine is placed in operation, it should be operated empty in order that the operator can become thoroughly acquainted with its various functions. The operator should make careful note of the adjustment of all parts and in this connection particularly, to the relative positions of the mixing plows and mullers, also the position of the bottom and side scraper plows, since the functioning of these parts has an important bearing on the mixing action of the unit.

The entire mixing mechanism should be thoroughly cleaned at regular intervals. Mixing mechanisms on regular production will be found to accumulate certain amounts of foreign material, both inside and outside. These accumulations often have a direct bearing on the life of the equipment. Here, as in the case of grinding and pulverizing equipment, the user should maintain a schedule for periodic thorough cleaning.

It is also desirable that the user maintain a regular schedule for lubricating all bearing points, using a small amount of high grade lubricant for each bearing, rather than an excessive amount at longer intervals. Where sealed bearings are used, such as in some of the mullers, these should be inspected at least once every month and when necessary, the old lubricant should be thoroughly flushed out and replaced with new.

The discharge mechanism on mixers generally add an important function in relation to plant processing, and therefore, should be maintained in good working order at all times. Daily inspection if necessary, is in order, depending on the materials being handled. Where a valve mechanism is used, as in the design of one type of pan and muller mixer, this should be kept clean at all times.

Conveyor Type Mixers

Conveyor type mixers when used for ordinary dry powdered products require very little care for maintenance. They should be kept properly cleaned and all bearings checked to see that no bolts become loose, also that the bearings do not become overheated due to dust or other material entering the bearings.

In mixing some types of products, it is essential that the mixer be kept properly sealed to prevent the escape of dust or gases, therefore, any sealing element such as felt packing and rubber gaskets, should be carefully inspected at frequent intervals to insure a tight joint at these points at all times. Some products tend to corrode the metal surfaces of the mixer more than others and after mixing these products, the mixer should be thoroughly cleaned to prevent contamination of the following batch, particularly if the new batch is a different material. This is especially necessary when handling foodstuffs. Frequently machines handling products where correct color or purity of product must be maintained, are made of stainless steel or other non-corrosive metals. These materials sometimes minimize the necessity of thorough cleaning between batches.

Only the main types of grinding, pulverizing and mixing equipment have been covered in this article. There are many other types of pulverizers used in the chemical industry such as disc mills, attrition mills, rod mills and rolls, but the important points in their proper care and maintenance are essentially the same as those given for the machines described above.

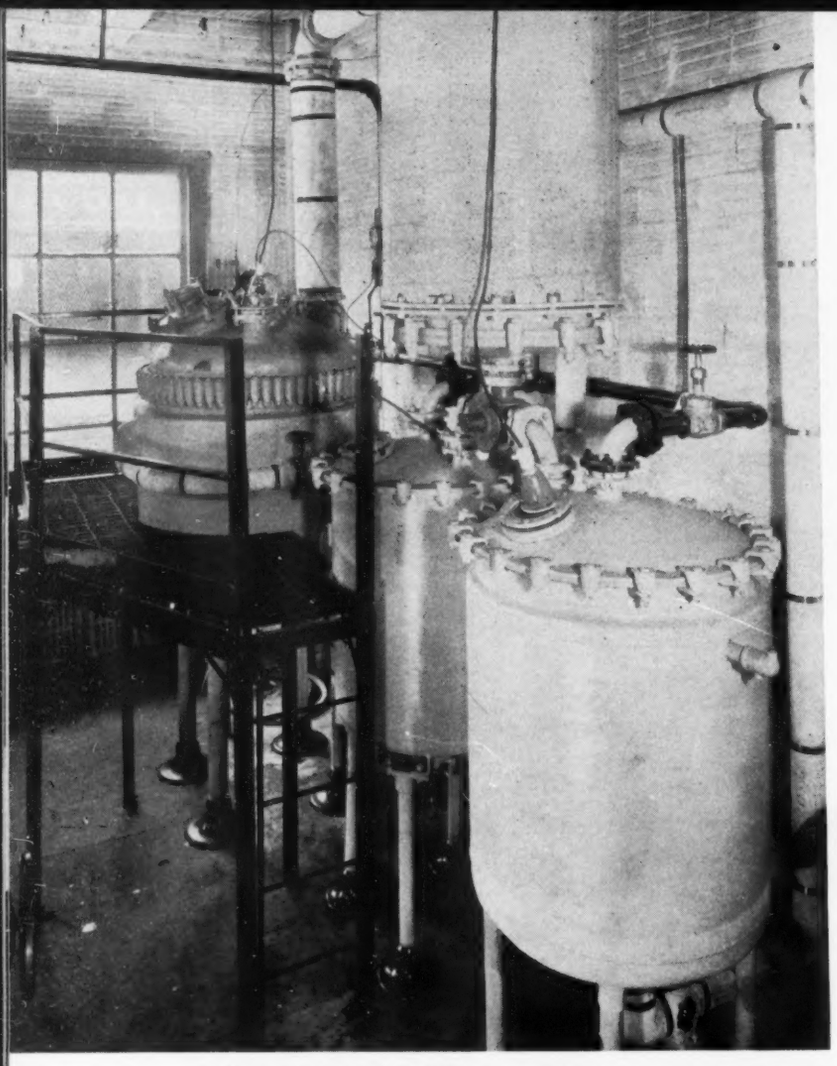
In conclusion it is suggested that routine inspection should be compulsory and one man made responsible for its fulfillment. The old adage that a "stitch in time saves nine" is certainly applicable to the proper operation of grinding, pulverizing and mixing equipment.

Std. of N. J. Wins Achievement Award

Dr. Webster N. Jones, president of the American Institute of Chemical Engineers and chairman of the committee of award for chemical engineering achievement, announced recently that the 1939 Award will be presented to the Standard Oil Development Company for its work in developing processes for the large-scale production of new aviation fuels and other synthetic chemical products from petroleum. Presentation of the Award will be made by the publishers of *Chemical and Metallurgical Engineering* on December 4, when the 17th National Exposition of the Chemical Industries opens at the Grand Central Palace in N. Y. City.

The Standard Oil Development Company, which employs more than 500 chemists and engineers, serves as a central research and development unit for the various manufacturing and sales units of the Standard Oil Company (N. J.). This group was the first to introduce the processes of high-pressure hydrogenation in petroleum refining and has since contributed many other advances in applying chemical engineering methods and principles. Its present achievements will make available many millions of gallons of new synthetic super-fuels such as are required by the advanced type of military pursuit and fighting planes. The European war has already demonstrated the immediate and pressing need for higher octane aviation gasolines that increase speed and climbing power during aerial maneuvers.

The Award for Chemical Engineering Achievement was established by *Chemical and Metallurgical Engineering* in 1933 to recognize meritorious advance to the industry and profession "made possible through a broader participation of the chemical engineer in the affairs of the process industries." Its first recipient was Carbide, followed in 1935 by the organic chemicals department of Du Pont. In 1937 the Award went to Monsanto for its spectacular development of elemental phosphorus. The Standard Oil group is the first technical organization outside of the strictly chemical industry to receive this biennial award.



Glass lined steel distillation assembly including jacketed steel, double jacketed condensor, two receivers with inter-connecting glass lined pipe and fittings.

How and How Not To Treat Glass Lined Equipment

By P. S. Barnes
Manager of Chemical Sales
The Pfaudler Company

GLASS lined steel process and storage equipment offers no distinctive problems in care and maintenance other than the procedure which would be observed in any properly conducted plant to avoid usage contrary to the working range and initial specification of the unit in question.

Before placing a given piece of glass lined equipment in service, the resistance of the glass enamel to the proposed chemical and temperature conditions should be checked carefully, if necessary with the manufacturers. All glass enamels are not equally resistant, furthermore, each maker of such equipment usually offers several types or grades, varying in resistivity, and has probably changed and improved his product over a period of years.

If alkaline conditions are involved, it should be remembered that all glass enamels are essentially silicates, hence subject to attack by caustic alkalies at even very low concentration. Milder alkalies can often be handled without undue solvent action on the glass. Fluorides should be avoided entirely, since mere traces produce rapid deterioration.

Glass lined equipment is available in a quality resistant to all mineral and organic acids at all concentrations and high temperatures, of course excepting H_2F_2 and possibly hot concentrated phosphoric, although it is probable that traces of fluorides may occasion this qualification.

Cleansers and sterilizers should not contain free caustic or fluorides. Sharp abrasives or steel wool should be avoided. Solids adhering to the glass enamel should be removed by a non-alkaline solvent if possible, otherwise with a wooden or soft-rubber-tipped shovel or spatula.

Heating and cooling operations by various jacket media should avoid subjecting the glass enamel to sudden thermal shock in excess of approximately 175° F. For the same reason, a process unit which has just been emptied of a high temperature batch should not be re-charged or washed out with liquid at room temperature. If steam is injected into the product, care should be taken that it does not impinge directly on the glass and cause erosion.

Heating of glass lined equipment by direct flame should be avoided, lest localized overheating cause fracture. It is sometimes practical to install an unjacketed piece in a furnace with intervening checker-work, so designed as to insure a uniform and not excessive external temperature from the gases of combustion. Very small pieces can be heated in a sand or oil bath or over a nichrome screen.

Jacket and internal operating pressures should not exceed the manufacturer's rating. In the case of jacketed equipment

which has already seen several years' service, it may be well to consider whether internal jacket corrosion has occurred, if so reducing the operating pressure as a precautionary measure. Any devices regulating or indicating jacket or internal pressure, such as reducing valves, pop safety valves, gauges, etc., should be checked periodically. Proper functioning of steam traps is essential to effective heating. Gaskets between glass enameled flanges should be inspected at regular intervals, as they may harden or disintegrate, allowing seepage of acid fumes or liquids and causing corrosion of the unprotected vertical outer faces of the flanges.

Asbestos Gaskets

Frequently a woven rubber-free asbestos gasket is the only answer to severe chemical conditions, such as a mixture of mineral acid and organic solvent, yet subject to leakage under pressure or vacuum because of its loose weave and absence of binder. This difficulty can often be overcome by housing all but the inner edge of the gasket with a U-section shroud of a suitably resistant flexible metal such as lead. Even though subject to slow attack, this facing will be protected by the asbestos gasket and by a coating of its salt.

Replacement Better Than Tightening

The gaskets should be replaced, rather than attempting to correct leakage by tightening the clamps or bolts and running the risk of fracturing the glass enamel. Agitator stuffing box packing should also be checked periodically, replacing before it becomes sufficiently hardened to score any enameled surface against which it bears. This applies particularly to chemical conditions involving halogens.

Warpage of Metal

In assembling the clamped or bolted-on covers of closed units and in bolting valves or pipe lines to flanged enamel-covered openings, allowance must be made for a certain amount of warpage of the metal, caused by the high-temperature enameling process. These joints must always be gasketed, as a bare flange will fracture the glass. Solid metal gaskets must not be used.

The bolt or clamp strain must be applied evenly, in order to prevent distortion of the metal and fracture of the glass enamel. An excellent method is to tighten (or loosen) the clamps or bolts one-half turn at a time, following around the circumference of the joint repeatedly. Where warpage is such that the joint cannot readily be made tight, the gasket should be built up where necessary. In the case of asbestos, it should be split at the seam and asbestos rope inserted. Shims should be used for rubber gaskets.

"Periodic inspections will detect an actual or incipient failure before extensive corrosion has occurred, perhaps beyond the point where reconditioning is no longer definitely economical."

Where the service conditions are severe, it is advisable to inspect glass lined equipment at periodic intervals. If exposed base metal is then discovered, field repairs may be practical for small areas or it may be advisable to return the entire piece to its original manufacturer for complete reconditioning. In either event, periodic inspections will detect an actual or incipient failure before extensive corrosion has occurred, perhaps beyond the point where reconditioning is no longer definitely economical.

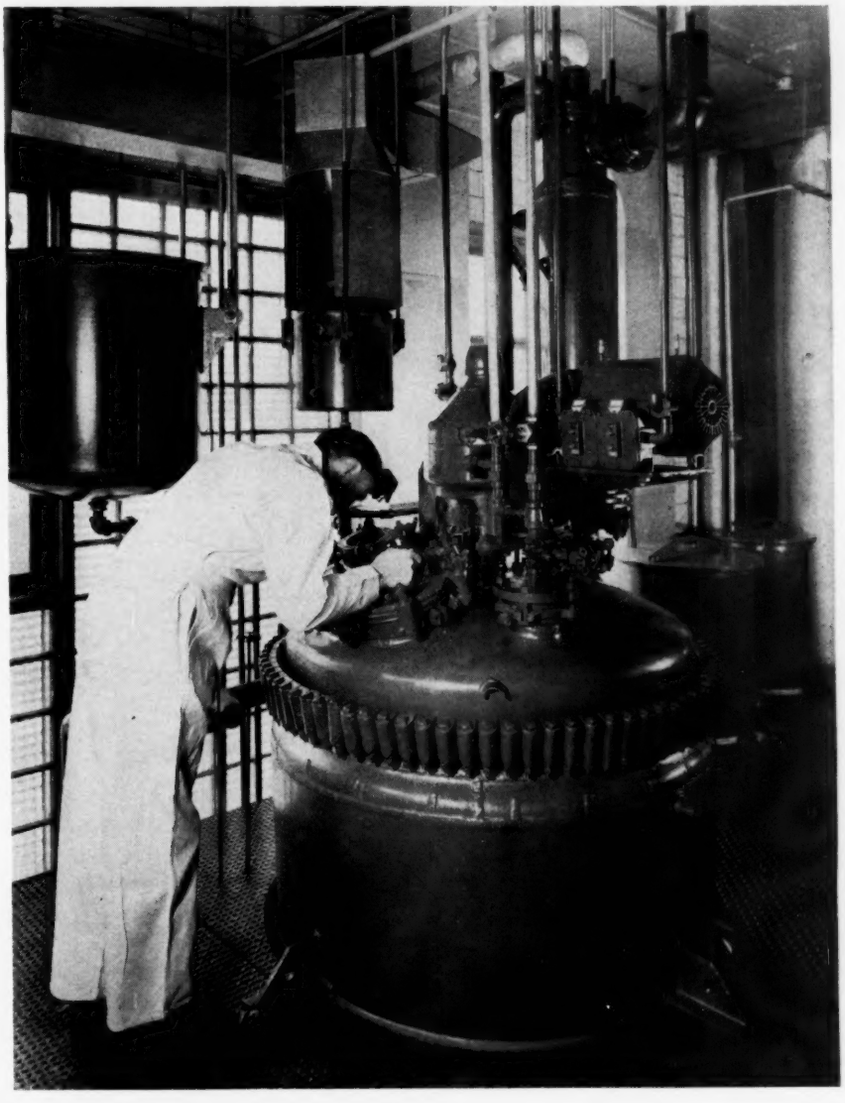
Field Repairs Practical

Field repairs to enameled equipment are entirely practical, provided that the area of exposed base metal is relatively small. For areas up to approximately ⅜" diameter, the preferable method is to drill and undercut, using dental tools and exactly as for filling a tooth, then tamping solidly with pure spongy gold. In the few cases where the solution to be processed will attack gold, a ceramic material can readily be substituted. Experience proves that such repairs, properly conducted, will in no way shorten the service life of the equipment. Acid-cured silicate patches can be applied to larger areas but require occasional renewal.

Major Repairs

Enameled steel equipment which cannot be repaired in the field can be completely and satisfactorily reprocessed by its original manufacturer. After removing the jacket and all accessories, all enamel is removed by blasting, and corroded areas repaired by welding and grinding, and complete new coats of enamel applied.

A glass lined reaction kettle for solvent recovery work.



Distribution substation and line terminal poles at Monsanto, Ill., plant

Maintenance of Electrical Equipment

By A. E. Marshall

Electrical Engineer, Monsanto Chemical Company

INDUSTRIAL plant maintenance in its broadest sense, without distinction between types of plants or equipment, involves primarily the matter of keeping things running. To accomplish this, maintenance may take one of two forms: either it may be limited in scope to the making of repairs as they are needed, or it may take the form of a broad study of the causes of difficulties with a view toward their elimination, thus setting up a preventive rather than a purely remedial program. Needless to say, preventive maintenance practices are being followed in most progressive plants today.

During the past four years, Monsanto Chemical Company has had an extensive preventive maintenance program under way at its Monsanto, Illinois, plant which has covered electrical as well as other equipment. The results obtained may best be described by indicating briefly the scope of the electrical system of this plant, the manner in which maintenance studies were used to eliminate causes of failures, and an outline of present practice.

The present electrical generating system of this particular plant consists of three turbo-alternators synchronized with the company's St. Louis, Missouri, power generating plant directly across the Mississippi River. The two power generating plants are electrically connected by means of underground and submarine cables.

High tension distribution at 2300 and 6900 volts is made through radial feeders to outlying transformer substations shown in the accompanying illustration, from which 440 volt radial feeders emanate to factory department distribution panels. Individual motor circuits are then taken from the distribution panels.

The number of connected motors in this particular plant exceeds 1300, which average 10 horsepower each, not including M-G set motors.

A Case History of Problems and Practice at the Monsanto, Illinois, Plant of the Monsanto Chemical Company

Oil-immersed motor starters frequently caused trouble which was found to be the result of breathing acid-laden air and moisture during temperature changes. Because of this the oil would lose its operating qualities and become contaminated with acid, the immersed metal parts corroding with eventual overheating and failure. The oil tanks were also attacked, corrosion took place, and the result was oil leakage followed by failure of the starters. These troubles were solved by substituting air-break equipment mounted in cast iron enclosures.

Thermal overload relays in low voltage air-break motor starters had been a common cause of motor failures. The bimetallic elements frequently corroded to such an extent that they became inoperable. Also, their susceptibility to manipulation by unauthorized and inexperienced workmen resulted in almost a complete absence of motor protection. The problem was solved by replacing this type of element with a standard element using the principle of melted solder to release a pawl engaged with a ratchet wheel in order to actuate the tripping mechanism which breaks the circuit.

Selection of motor starters of simplified design with least moving parts has aided materially in reducing motor and starter maintenance.

A most frequent cause of failure in open type motors has been the action of water and corrosive liquids on the windings of the motors. Proximity of open tanks into which corrosive liquids are pumped and which occasionally overflow, and the use of a water hose when washing floors, tanks, walls, etc., all tended toward the production of failures in open type motors.

A study of this problem has resulted in the use of totally enclosed motors, which move has been the chief factor in the motor failure improvement which has since taken place. Although the number of motors in service has increased from 720 in 1936 to the present total of more than 1300, the number of motor failures during that period has remained approximately constant with an average of 31 failures per year. The total of 124 failures for the four years nearly completed consisted of 90 per cent. open-type motors which failed for the reasons just stated, and 10 per cent. totally enclosed motors. The reasons for the latter failures were due to three conditions, namely, bearing trouble caused one case, a faulty coil connection another, and in the remainder, water which entered the inner frame through non-watertight connection boxes. The last named condition was discussed with the motor manufacturer who agreed to furnish watertight connection boxes of cast construction on all future motors. The troublesome boxes have been replaced on existing motors.

The ratio of motor failures to motors in service for 1938 was 2.9 per cent. and the outlook for the present year is even better.

Helping Motor Performance

The study and application of preventive measures in connection with motors and associated apparatus has resulted in vast improvement in motor performance and service with an appreciable reduction in maintenance and repair costs.

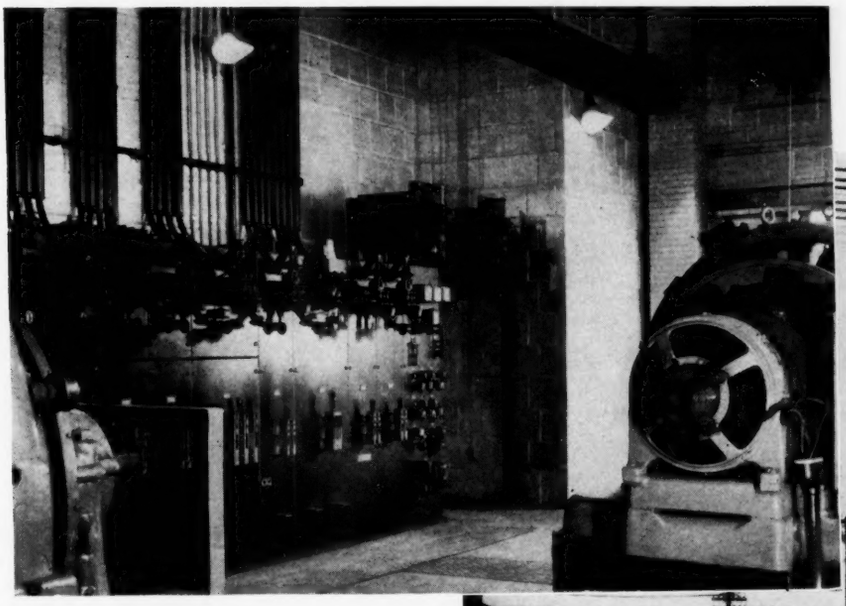
The use of float switches for pilot control of motors presented its share of troubles in float failures, freezing of the float rods in their guides, and general corrosion of mechanical linkages. This type of pilot control has been abandoned to a considerable extent in favor of an electrical arrangement in which electrodes, connected to relays, are suitably placed to perform the same functions as the float and its associated parts. The new method has provided greater flexibility, a wider scope of application, and less trouble.

The problem of lighting maintenance, with particular reference to lights placed on the exterior of buildings for localized general illumination at night, and which lights were seldom turned off, suggested a need for improvement. These lights were operated from their respective lighting panels located in the several buildings. Inasmuch as artificial lighting is required in the buildings during daylight hours as well as during night hours, it became common practice to turn all lights on and leave them burning continually.

Later, an electrician was assigned to the task of turning off building exterior lights each morning, with the result that approximately one hour each day was required for the operation.

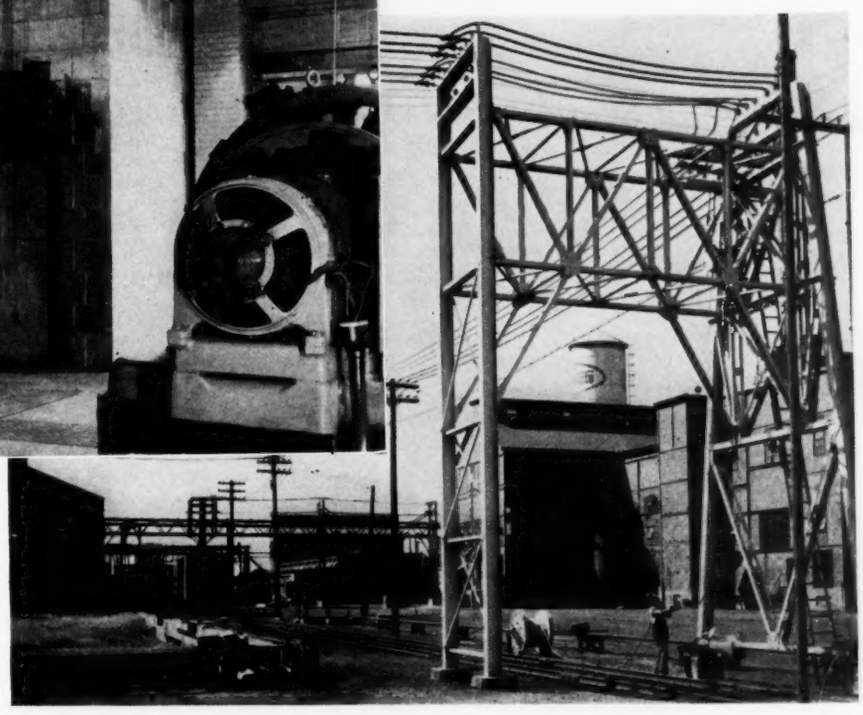
It was conceded that still better control could be had by energizing the existing exterior lighting circuits through the contacts of inexpensive relays, the coils of which would be energized from the general yard lighting circuit which in turn is controlled at a central location. This idea was adopted, and the results are fewer lamp renewals, less wasted energy, and approximately 365 man-hours per year made available for better purposes.

The operation of electrostatic precipitators and rectifying equipment required considerable attention prior to the use of an organized maintenance schedule and the use of printed forms. Chief among the difficulties were failures of insulators by flashover caused by accumulation of dust on their surfaces, and burning of rectifier rotor arms from the same cause. Periodic inspection and cleaning are the present order, and the use of a printed schedule has insured that proper attention is given to all parts as well as providing performance records for reference purposes.



Above, motor-generator set room at the chlorine plant

Below, low tension distribution lines and supports



Chlorine Plant Equipment

Annual Inspection Report

M-G Set No. 5

Inspector Callahan Myers Date Begun 4-4-38 Date Completed 4-4-38

Check 24-volt tripping circuits through

No. 38 Relay contacts OK No. 27 Relay contacts OK
No. 48 Relay contacts OK Control Sw. contacts OK
No. 51 Relay contacts OK No. 41 Relay contacts OK

Oil Tests

No. 42 breaker. As found Good Changed? No As left Good
No. 6N breaker. As found " Changed? " As left "
No. 6C breaker. As found " Changed? " As left "

Megger Tests

Motor leads, OD. substa. to Bldg. CF

Previous		Present	
A to Gd. Inf.	A to B Inf.	A to gd. Inf.	A to B Inf.
B to gd. "	B to C "	B to gd. "	B to C "
C to gd. "	C to A "	C to gd. "	C to A "

Motor leads and armature, Bldg. CF/

Previous		Present	
A to gd. 200		A to gd. 200	
B to gd. "		B to gd. "	
C to gd. "	C to gd.	"	

Motor field. Previous Inf megohms Present Inf megohms
Generator armature and main leads. Previous _____ Present .7 on 1.6 on
Generator field and leads. Previous _____ Present 100 on 100 on
A.C. control wiring, to gd. Previous _____ Present 20 megohms
D.C. control wiring, to gd. Previous _____ Present Infinity ohms

Remarks: Exciter windings cleaned and varnished.
Exciter commutator was turned and undercut.
M. G. set was thoroughly cleaned and painted.
Steel supports for A.C. B. cleaned and painted.
All equipment in control room was painted.
24 volt tripping battery was replaced with a new battery.

Signed H Greer. Inspector

Another sheet attach quarterly to this.

Sample of the printed form employed for reporting on maintenance work

Maintenance of motor-generator sets was formerly spasmodic and usually took the form of correcting difficulties which had already taken place. The sets would frequently fail to start, or would not go into the running position. Due to the lack of knowledge and complexity of the control system much time was wasted in locating the faults. The machines were dirty, excess oil was thrown from the machine bearings to the switchboard, and general corrosion of open-type relays existed.

Corrective measures consisted of applying a periodic inspection schedule and the use of printed forms, a sample of which is shown. Needless to say, improved performance has resulted, and the greater knowledge obtained through more intimate contact with details of the control and devices has aided in preventing unnecessary shutdowns or recurrences of former difficulties. In addition, cleanliness is the rule at all times, and bearings are equipped with oil cups for maintaining correct oil levels. Air circuit breakers have recently taken the place of oil circuit breakers in low voltage distribution substations. Although maintenance had little to do in the selection of air circuit breakers, it has benefitted by their use in faster tripping action which on one occasion prevented the necessity of replacing the bus and fuse units in a distribution panel. Maintenance required by the air circuit breaker installation has been negligible and it might be attributed to the value of the cubicle construction, which is housed in brick buildings. Thus, air circuit breaker cubicle construction has so far indicated another improvement in the maintenance problem, and regular inspections show that we may expect such improvement as being permanent.

High tension switchgear, representing the nucleus of the plant electrical system, presented no constant difficulties as did the problems previously described. However, those failures which did occur transcended the accumulated effects of other more frequent outages in production loss, repair parts costs and attendant labor costs. During 1937, a plant electrical survey indicated that oil circuit breakers were unsuited for the service imposed upon them, bellows-plunger type overload relays were unreliable as a result of corrosion, disconnect switches were without blade locks, potheads leaked, high ambient temperatures existed, leaks in mechanical apparatus presented hazardous conditions, and lightning arresters were green with corrosive oxides, all of which were potential sources of trouble. One cable failure resulted in the partial rupture of two breakers, the corresponding disconnect switches were forced open under short circuit, and molten parts of the switches contacted and ruined four cells of a control battery. The load involved was approximately one-third of the entire plant load, the outage time was twenty-eight hours for repairs plus eight hours to re-establish operating temperatures for manufacturing processes.

The net result of that part of the survey and the failure was a complete new installation of cubicle switchgear, cables, and lightning arresters for the 2300 volt system which not only corrected the former undesirable features but included improved safety features, provisions for expansion, and improved maintenance features.

The 6900 volt system is comparatively new, and, needless to say, it contains all the features that previous study has shown to be desirable.

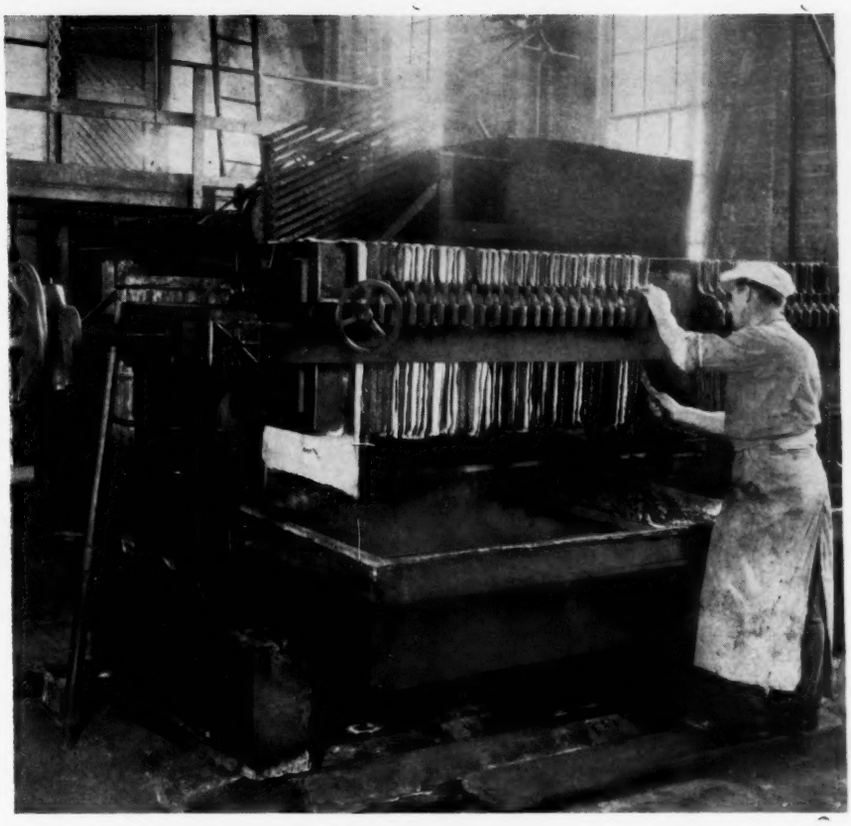
Insulating oil for switchgear and transformers was formerly tested infrequently, and much was thrown away rather than submit to the inconvenience and cost of sending samples to the laboratories of a transformer manufacturer. A portable testing outfit was recently purchased which together with our own chemical laboratory facilities has produced the desired results in knowledge of oil conditions, records, and elimination of waste. The same outfit is now being used to determine the dielectric qualities of some of our products.

The use of circuit analyzers, portable recording ammeters, wattmeters, tong-testers and other instruments have their value in locating troubles, electrical as well as other types, determining circuit loading conditions and provide basic data for electrical development and procedure.

Value Demonstrated

In conclusion, it can be said that the value of the preventive maintenance is at once apparent when applied, and in the use of necessary instruments with which to accurately locate and catalog those faults which remain, the maintenance department performs an important function and the possibilities for further improvements in that field are without end. Through improved maintenance, a broader knowledge of equipment has been gained, reliable records have accumulated, an improved attitude toward the care of equipment has resulted, maintenance costs have been reduced, and cleanliness, orderliness and greater reliability are an aftermath of concerted efforts.

Longer Useful Life *for your* Filter Presses



THE proper care of a filter press depends upon its proper operation. There are many types of filter presses with different design features intended for variable operating requirements. Consequently the different materials filtered and different operating cycles would necessitate some variations in the attendant care of a filter press, depending on its specific design.

The objective of separating solids from liquids may be classified further into the ultimate purpose of whether solids only, clarified liquids only or both are desired. Upon this depends the selection of not only the filter press itself, but the kind of filter medium to use. For the recovery of solids only, one of several types of filter cloth may be satisfactory, whereas for filtering to secure perfect clarity of liquids, it may be necessary to use not only cloth or cloth and filter paper, but quite frequently some kind of filter aid, such as powdered diatomaceous earth, paper or asbestos pulp, talc, activated carbon, magnesia or other products which may be used as a precoat and also mixed with the liquid prior to filtration and then filtered out of it together with the undesirable solids, thereby producing a clearer liquid at a faster filtering rate. Some of these filter aids may even serve as bleaching, decolorizing or deodorizing agents.

Where cake recovery (solids) is the major objective the cycle includes:

Forming the Filter Cake

The material is fed into the filter press, with all outlet cocks in an open delivery press and all valves on the filtrate delivery line of a closed delivery press open. The solids build up in each filter chamber simultaneously and the pressure increases as the cake thickness increases until the cake forming period is completed, usually indicated by the cessation of flow of filtrate at the outlets.

Washing the Cake

If the filter cake must be washed, or all the soluble values retained in the cake must be recovered, the wash water line valve, kept closed during the filtration operation, is opened for the removal of any soluble content in the cake. Before doing this, however, it is frequently desirable to remove as much liquid as possible from the press which can be accomplished by the introduction of compressed air which, at 30 pounds pressure, will suffice to push most of the liquid remaining in the filter chambers upon completion of the filtering operation. Steam may also be used for this purpose. The wash water or other washing liquid is then introduced and passes through the filter cloth, then through the cakes in the chambers and through the other set of cloths of the adjacent plates and out of the press. The washing cycle completed, the cake can then be partially dried by a final blowing of air or steam through the cake, unless it is preferred in a paste or sludge form.

Removing the Cake

With all feed lines to the filter press closed, and with the pressure gauge on the press indicating a drop to five pounds or less, the screw is loosened and the follower pulled back. The plates and frames are then pulled back one by one and the cake removed from the frames and scraped from the cloths if necessary. The amount of work involved here depends on the nature of the cake, but care should be taken so that all solids are removed from the joint surfaces and that the inlet ports and channels are not clogged. In scraping cloths, care must be taken to avoid tearing or ripping them which, of course, would make them useless.

Philip Kriegel
Spooner and Kriegel
New York, N. Y.

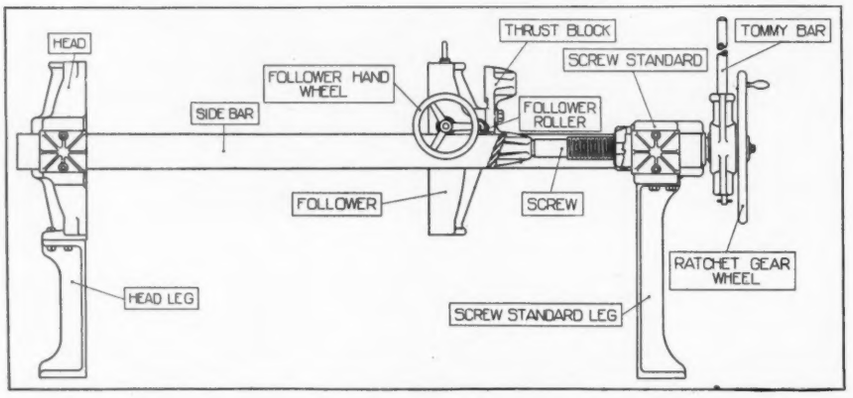
Preparing for the Next Cycle

Before closing the filter press for the next cycle, all joint surfaces should be

inspected for cleanliness and cloths for any wrinkles that would affect joint tightness and holes in cloths. It is also well to remember that a clogged feed port in any frame will cause uneven pressure on the plates comprising that chamber, leading to plate breakage. Therefore, feed ports in frames should be inspected. This applies also to the discharge ports since they also sometimes become clogged. These inspections and cleaning are done as the press is closed chamber by chamber, whereupon the thrust block is then swung into position, the screw tightened and the filter press is then ready for the next filtration cycle.

Clarification

The general procedure in filtering for the recovery of clear liquid is substantially the same as for cake recovery for it



Skeleton of a filter press showing head, follower, side bars, screw standard and typical closing mechanism.

must be remembered that both can be carried out simultaneously. However, where the solids in the filterable fluid are not desired and the suspending liquid must be of absolute clarity special treatment for the fluid must be often provided. This involves, as previously stated, the use of suitable filter paper, or precoats for the filter medium and filter aids for the filterable mixture, if necessary. The use of filter paper over filter cloth permits quick and easy cleaning of the plate by simply stripping the paper off the cloth and replacing with fresh paper after one or more cycles.

Precoating involves the pumping of a filter aid and water into the filter press, before actual filtration of the material commences. The quantity to use for precoating depends on the thickness of precoat required: as a rule 5 to 15 pounds of filter aid per 100 sq. ft. of filtering area. The precoat forms a uniform layer on the cloth in all the chambers of the filter press.

After the precoat is formed, the material to be filtered is pumped into the filter press. Filter aids may or may not be used with the batch of material, depending on the process involved. The length of filtering cycle depends on the amount of solids in the material and on their physical characteristics. The use of filter aid obviously increases the amount of solids and reduces the clarifying period. The pressure in the filter press rises as the cake in the filter chamber and resistance to flow of liquid increase.

Supervision and Maintenance

The filter press is a relatively simple processing machine. Once the filtration operation has been started, the filter requires no attention during this part of the cycle, since the by-pass relief valve, with which most filter presses are equipped, will cut off the flow to the filter when the maximum pressure caused by filling the filter is reached. If no relief valve is used only such supervision is necessary as is required to watch the pressure at intervals during the run.

For removal of cake, the work required involves no special skill and ordinary plant labor can be used for this purpose. Dumping a filter, cleaning, inspecting and closing for another cycle take a comparatively short time ranging from a few minutes to an hour or more, depending on the size of the filter and the nature of the material.

Beyond replacement of the filter medium as required, there are practically no replacement costs. On side feed filter presses, rubber collars or cloth pockets require occasional replacement and on center feed types, clip nuts if used, sometimes require replacement. Normally plates and frames last indefinitely, except for breakage due to clogged ports or carelessness in handling. The cost of replacing plates and frames is low and of course involves no complicated repairs.

It should be noted that in scraping cake from filter cloths great care must be exercised to avoid gouging, tearing or ripping. More damage is done to filter cloth due to carelessness with paddles, scrapers, hoes and other tools used for this purpose than by any other cause.

Eliminating Operating Difficulties

Leakage—

The plates and frames of a good filter press are tooled so as to assure accurate, parallel joint surfaces, so that when clean, these joints will be tight. Leakage must, therefore, be ascribed to either a wrinkle in the filter cloth or other filter medium or to filter cake in the joint surface. Serious leakage, except for special cases which are taken care of by means of special leak-proof gasketed joints, may be due to carelessness in operation or insufficient tightening of the filter press.

Cloudy Filtrates—

If, beyond the first few minutes, cloudiness of filtrate persists, the trouble may be due to a number of causes. The material may require a filter aid in the main batch or a precoat on the cloth or both. If in an open delivery filter an individual chamber runs cloudy, there may be a break in the filter cloth. This, of course, can be readily identified, the chamber cut off at once by closing the outlet cock, thereby ending the filtration process in that chamber. Continued cloudiness from any chamber calls for careful inspection to determine the cause. Since there is no other way of determining the faulty chambers which cause cloudy filtrate in closed delivery filters, the only suggestion is to equip the press with visible discharge fittings. This device with a shut-off makes it possible to identify the faulty chamber and cut it off.

Uneven Filter Cakes

Uneven distribution of solids in the filter chamber over the entire chamber area may be due to a clogged feed port in the frame. This should be avoided so as to avoid possible plate breakage. Uneven cakes may be caused also by pumps of inadequate capacity or too low a pressure. On some types of free flowing materials with granular or crystalline solid content, bottom discharge types of plates may lead to uneven filter cakes, because of the rapid filtration of material at the bottom section of the chamber before a solid, uniform cake is built up on the entire surface of the medium. In such cases a top discharge type of filter is often advisable. Uneven filter cakes are not only likely to lead to cloudy filtrates where there is any possibility of pressure fluctuation in the feed line, but make it difficult to get good washing of the cake in any chamber where cakes are uneven.

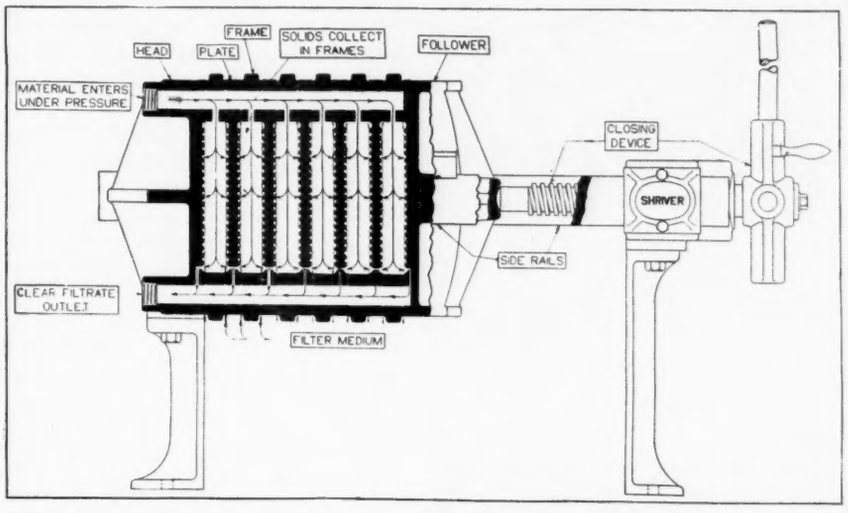
Slow Filtration Rates

Some materials, by their very nature, make the rate of filtration slow despite the use of all physical means of acceleration. However, all possible means of speeding up the process should be investigated such as the use of filter aids, heating the material before filtration, or other changes in processing prior to filtration

which would change the character of the material to make speedier filtration possible.

Poor Precoats of Filter Aid

Where there is difficulty in getting a uniform coating, the reason may be due to the type of filter used. Frequently a filter press installed for one operation is pressed into service for a precoat filtration operation, without thought of its adaptability for the purpose. For precoating work, the delivery outlet should be at the top of the plate or the delivery pipe should be carried above the top of the filter. This will provide for full chambers during deposition of the precoat, providing uniform distribution over the entire cloth surface and counteracting any tendency toward settling of the filter aid.



Sectional view of typical assembled corner feed filter press showing plates and frames in place on filter press skeleton and indicating principle of operation. This chart and all others in this article, courtesy T. Shriver & Company, Harrison, N. J.

Plate Breakage

Careless handling of filter plates is one source of breakage but the main cause is clogging of feed ports in frames adjacent to them. When a feed port in a frame is clogged, no material can enter the chamber formed by that frame. The full operating pressure is then exerted against one side only of each of the plates adjoining the clogged frame. For example, a 42" plate with 1600 square inches of filtering area will have to withstand a pressure of 96,000 pounds exerted on one side only, if the feed port of the adjacent frame is clogged and an operating pressure of 60 pounds per square inch is attained. Obviously it is impractical to make a plate capable of holding up under such unbalanced pressures.

The first sign of clogging is the finding of a chamber not properly filled or an irregular or diminished discharge of filtrate from an outlet cock. The frame of that chamber should be inspected as soon as possible and any obstruction removed. Frequently the channel will have cleared itself but continued partial filling of chambers indicates a situation which will lead to breakage unless remedied. It is again suggested that the ports in the frames of all side and corner feed filter presses be inspected regularly every time the press is opened. The flow from individual chambers cannot be observed in closed delivery filter presses. Hence inspection of ports is all the more important.

Ports in filter plates can also become clogged. If a cloth breaks, solids are deposited on the pyramid surfaces until the ports are clogged. This leads to uneven pressures when washing.

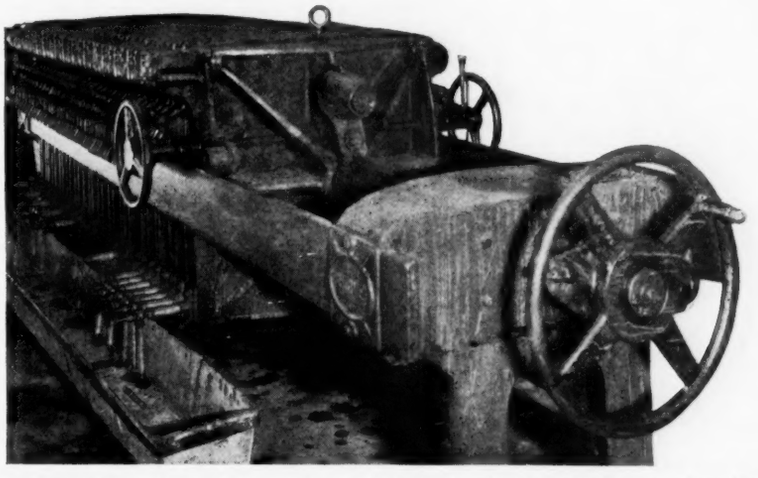
Care of Plates and Frames

It is always advisable to keep plates and frames in the best possible condition, whether in or out of service. The assumption is that such materials of construction are used in the filter plates and frames as will best withstand the corrosive, abrasive or other physical and chemical action of the fluid being filtered. Beyond that point, metal plates and frames should be kept clean and dry when not in use. Cast iron plates and frames may be coated with various lacquers, varnishes or paints available, depending on the resistance of the coating to reaction with the filterable material. This considerably lengthens the life of the plates by preventing rust formation and prevents contamination of the filtrate and solids.

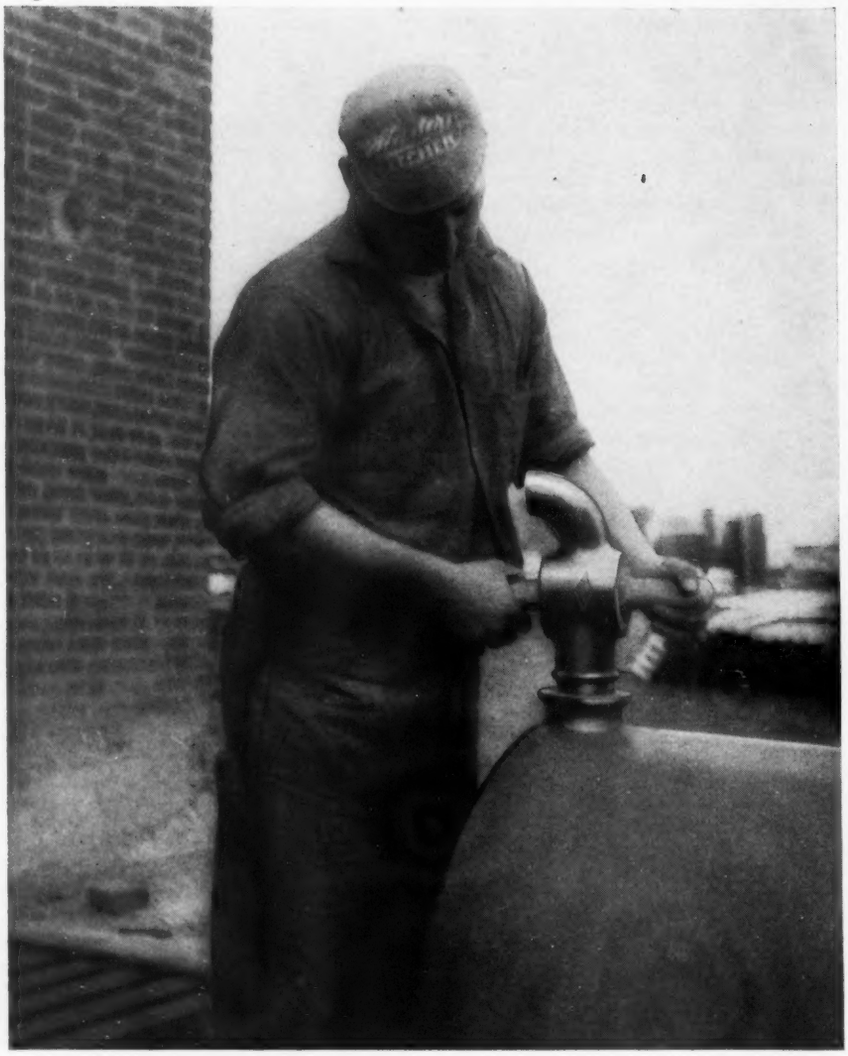
Wooden plates and frames present a special problem because of the unfortunate susceptibility of wood to temperature and climatic changes, shrinking, swelling and possible warping. When a wooden filter press is first assembled, the nuts on the bolts holding the sections of plates and frames together should be hand tight only. After the press is assembled and clothed, it should be tightened and filled with water, of which a stream should be kept flowing constantly for several days until the wood has swollen sufficiently to become tight. As the swelling proceeds, the nuts on the bolts should be backed off to avoid their cutting into the wood. After the swelling has stopped, the nuts should be tightened.

In storing a wooden filter press during periods of inactivity, the press should be kept tightly closed and full of water, if possible. In storing spare plates and frames, they should be kept in a tank of water with heavy weights on them or in a screw press so they are not allowed to warp. Once they are warped it is difficult to bring plates and frames back into shape, but it may be accomplished by soaking them in warm water for several days and closing them tightly in the filter press. For cold or slightly warm filterable solutions yellow pine is suitable, but for hot solutions maple is preferable.

No special care is required for molded rubber plates and frames except that high temperatures should be avoided. They cannot be used at pressures as high as those for wood or metal.



Proper care of your filter presses requires an intimate knowledge of their use and limitations. Built ruggedly, they represent a long-term investment. Like any other piece of equipment they require a certain amount of periodic attention.



Chemical *Stoneware* Equipment

THE natural approach to the problem of equipment maintenance is to determine first the various ways in which failure or deterioration may occur, and then what preventive measures must be taken to avoid them. In the case of chemical equipment, corrosion is often the major cause of high maintenance costs unless the equipment used is entirely resistant to the active products that are being handled.

Vitrified clay ware offers the advantage that it is completely immune to the destructive elements that play havoc with maintenance costs in plants handling products that are highly corrosive or that are sensitive to contact with metallic or organic materials.

Practically no expense is involved in the upkeep of chemical stoneware equipment which when once properly installed and protected from abuse requires no further attention. Maintenance is, in fact, mostly limited to the replacement of the less permanent accessories such as pump packings, bonding materials, gaskets and metal fittings.

Attention to a few points in design and installation is all that is needed to ensure trouble-free service from chemicalware equipment. Failure usually occurs from the ware being struck or dropped, from being subjected to tensile or transverse stresses for which it was not designed, from thermal shock, from continued vibration and occasionally from the absorption of crystallizable solutions. The means of avoiding such failures are rather obvious but as they are often ignored it may be advisable to draw attention to them.

Chemicalware equipment should be carefully examined on receipt and again on completion of the installation. If it has been allowed to fall on to a hard surface or otherwise mishandled a fine hair crack may result that is sometimes almost invisible. The defect may be made to stand out by wiping with an oily rag and it will not have, when struck, the familiar ring of a sound piece of ware. Such mishaps may be avoided by unloading the ware on to a soft pad, particular care being taken not to put any strain on outlets and other projecting parts. In unloading carload shipments the packing material 'round the ware should be completely removed before it is lifted out of the car. On completion of the installation, outlet faucets and similar exposed parts should be provided with a shield to prevent their being struck by passing trucks, etc.

Failure due to tensile or transverse stress may be caused by using the ware for purposes for which it was not designed, as for example, by subjecting to vacuum or pressure, filters intended for gravity filtration only or by operating acid eggs at pressures higher than the safe working pressure specified by the manufacturer. More frequently, however, such failures are due to faulty installation. In the case of equipment carrying a heavy load such as large tanks, or jars, or tower bottoms, it is important to distribute the weight evenly over the entire bottom. If the weight is carried only on three points as would normally be the case if no provision is made for distributing the load, uneven stresses are set up in the bottom and walls of the equipment that are likely to result in fracture. Quite frequently this occurs at a location remote from the point of application of the stress which occasionally raises some doubt as to the real cause of the failure.

The best way to distribute a heavy load is to place the equipment on a bed of soft cement which when set conforms to the shape of the bottom and thus ensures even distribution. Adhesion of the cement to the bottom may be prevented, if desired, by coating with grease or by laying a sheet of paper over the cement. Another convenient way to distribute the weight is to set the equipment on a bed of loose sand retained by a sill of brick or cement.

Thermal Abuse

Thermal abuse may also result in failure of chemicalware equipment. The average grade of chemicalware as used for storage, drain lines, ventilating ducts and similar services will not withstand any severe thermal shock but special ceramic bodies have been developed in recent years which may safely be subjected to rapid fluctuations of temperature over a very wide range. If any such condition has to be met it is obviously important that the manufacturer have complete in-

formation to enable him to select the body best suited to these requirements. Where these special bodies are not used the rate of heating and cooling must be carefully controlled. Change in temperature at the rate of about 2° C. per minute is usually considered to be safe. It should be noted that the rate of cooling is at least as important as the rate at which the temperature increases. It is no less important when installing such equipment to provide for expansion and contraction.

Vibration transmitted by walls or floors is another possible source of damage to chemicalware equipment. Where possible such equipment should be installed in a building that is free from vibration but where this cannot be done it should be set on a pad of rubber or other resilient material.

While for most practical purposes chemicalware is non-porous and some grades are actually so, other bodies used for chemical equipment have a measurable pore volume that can be determined by standardized methods. If a body having an appreciable pore volume is used as a container for a solution of a crystallizable salt with a low surface tension such as a plating solution, the absorption of the solution and subsequent crystallization in the pores of the ware may in time break down the internal structure of the body and result in failure of the container. This can, of course, only occur if the wrong body is used for the purpose and it is therefore necessary again to emphasize the importance of giving the manufacturer full information as to the conditions under which equipment is to be used.

Reference will now be made to a few special points applicable to certain types of equipment.

Centrifugal Pumps

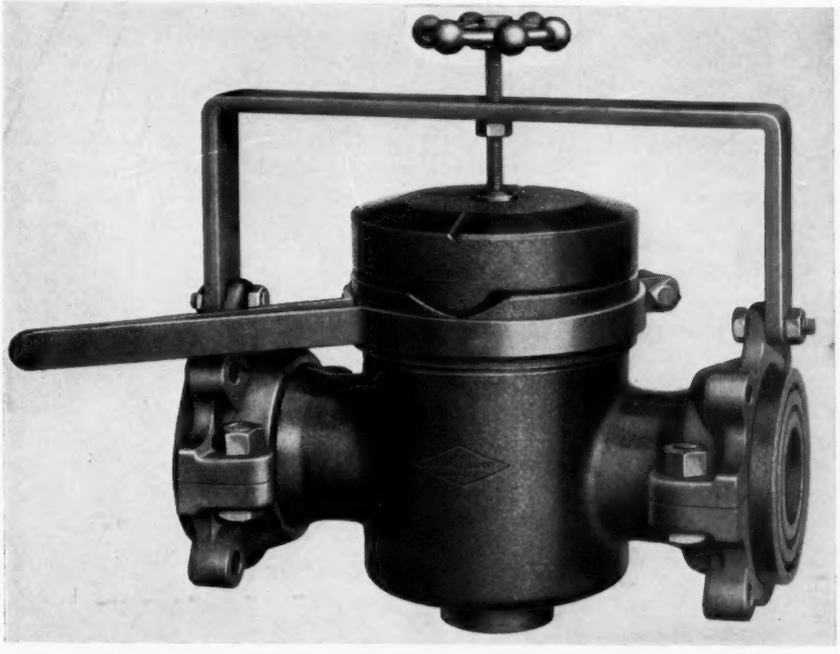
Stoneware centrifugal pumps for handling corrosive liquids of all kinds have been in satisfactory service for over thirty years. The impellers are made of a special ware having a high tensile strength and zero absorption. Breakage of the vanes of the impeller may be caused by the admission of hard lumps of solid matter into the housing or by the freezing or crystallization of liquid left in the pump after it has been shut down. The obvious precautions are in the first case a screen at the intake and in the second case to drain the pump after use if any such contingency is likely to arise. Another possible source of trouble is in replacing the cover of the pump housing. If a thinner gasket is used than that originally furnished with the pump the cover may touch the face of the impeller and break it as soon as it is started. If the gasket is too thick, the increased clearance between the cover of the pump housing and the face of the impeller will reduce its efficiency but will otherwise do no harm. A full stream of liquid should not suddenly be admitted into a pump that is running empty at high speed. The stuffing box of these pumps requires special attention as it is obvious that no packing can have the unique resistance to corrosion of the material from which the pump is fabricated and consequently this packing has to be renewed at intervals depending upon the nature of the liquid being handled. A ground and polished stoneware sleeve made integral with the impeller runs in the stuffing box and this sleeve may be broken unless a few simple precautions are taken. The stuffing box should not be allowed to run dry and the simplest way is to allow a slight leakage at all times, a small container being furnished to catch this drip. If this is objectionable a lantern gland is supplied which keeps the packing moist by flushing a very small amount of water or other liquid back into the pump. The gland, which is also of stoneware, should be drawn up evenly and not tighter than is required for the purpose. The packing should be replaced whenever it is necessary to exert more than a moderate pressure on the gland. The sleeve of the impeller is sometimes scored through inadequate lubrication due to air being sucked into the pump through the stuffing box. This may occur if it is attempted to reduce the capacity of the pump by cutting down on the intake while running the impeller at full speed.

Percy C. Kingsbury
Chief Engineer
General Ceramics Company

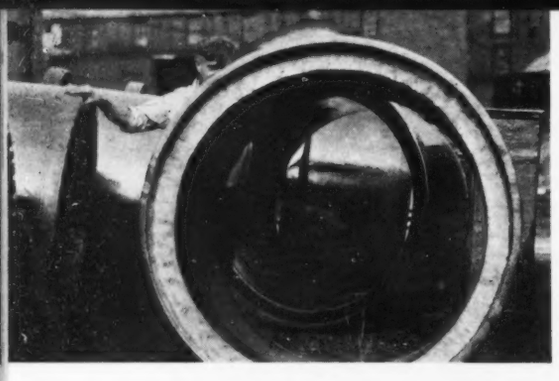
In other respects stoneware pumps should have the normal attention given to any other type of pump. For example, perfect service cannot be expected from a pump if acid is allowed to slop over it and eat away the base plate and foundation bolts.

Blow Cases (Acid Elevators, Acid Eggs, Air Lifts)

The safe working pressure recommended by the manufacturer should not be exceeded and this should be ensured by a reducing valve on the air line and a positive safety valve between it and the apparatus. As the bursting of one of these vessels, due to carelessness, may lead to a serious accident they should be installed in a box or a pit which may advantageously be filled with sand or cement.



Chemical stoneware equipment today is available in many complicated forms and shapes to perform special duties. Proper care of these parts is vital to insure long life.



Pipe Maintenance Problems

Cylindrical flanges with cored bolt holes are inadvisable in stoneware pipelines as it is difficult to tighten them without breaking out the section of the flange between the holes. Solid cylindrical flanges held together by bolts connected to metal back flanges are also seldom advisable as any unevenness in the tension of the bolts is likely to break off the flange at the neck. The preferred type of flange for stoneware pipe is in the form of a cone with a solid angle of about 40° to which is fitted a split metal back flange of the same taper connected by bolts to the corresponding flange.

The bolts should be drawn up with the fingers until they are all of approximately the same tension. They should then be tightened in rotation by means of a wrench, one-quarter turn at a time and the bolts should not be drawn tighter than is necessary to make a perfect joint. Any attempt to stretch or bend a stoneware pipe in tightening up a joint will usually result in the fracture of the pipe. A gasket is usually employed with this type of joint but where this is inadmissible the faces of the flanges may be polished so as to make a perfect stoneware-to-stoneware joint. Running lengths are usually furnished in 5 foot sections and where a resilient gasket is used nothing more is necessary to take up expansion or contraction. Such provision must however be made in long pipelines with polished joints due to the rigid construction. A hanger or other support should be provided for every 5 foot length and special supports should be furnished for fittings.

Bell and Spigot Piping

Bell and spigot piping is supported in the same manner as flanged piping. Allowance for expansion and contraction is usually made by leaving a very small space between the inside of the bell and the spigot end of the adjacent pipe. The method of luting bell and spigot joints is important from a maintenance viewpoint but is too large a subject for this article. In general a luting material must adhere firmly to the ware, must not expand or contract on setting, should have some resilience and strength to withstand a moderate internal pressure or suction, must of course have good resistance to the fluids that the pipeline is to carry and must retain these properties over a fairly wide range of temperature. It should also be inexpensive and easy to apply. There is no universal luting material but for most conditions of moderate service there are one or more materials that can be used.

Faucets

Most of the stoneware devices used for regulating the flow of fluids are of the plug cock type although others such as diaphragm valves, etc., are available. Stoneware lends itself exceptionally well to the fabrication of plug cocks as there is little or no wear, as the special body developed for this particular service is hard and dense, and the fine polish given to the contacting surfaces ensures ease of manipulation. Particular care must be given to the thorough cleansing of ceramic faucets and valves before they are put into service. A minute particle of dirt between the body and the plug may cause leakage and may score the ground surfaces. After cleaning, the surfaces of contact should be very lightly smeared with vaseline or graphite which should be renewed at intervals depending on the purpose for which the equipment is being used. If used under pressure, due to a considerable head of liquid or otherwise, it is necessary to retain the plug in the housing by means of a simple yoke or spring, otherwise the inadvertent raising of the plug may result in an accident from spurting acid. This may be avoided by the use of a hood made integral with the plug that serves to divert the acid downwards. The bottom of the housing may also be closed to prevent any drip in case of leakage. Almost the only difficulty experienced with stoneware plug cocks comes from the plug becoming stuck in the housing. This may occur if they are not greased occasionally as described above, particularly if they are used under vacuum. This may also happen if salts are allowed to crystallize in the faucet or valve. No such trouble will be experienced if they are given the very small amount of attention they require. Stuck plugs can often be released by placing a block of wood on the underside and gently tapping with a hammer. A more effective way is the use of the "Neverstick" feature shown (page 564), in which a separate notched ring exerts a wedge effect on a special head which forms an integral part of the plug. Attempts to release a stuck plug by using a heavy wrench on it will almost certainly result in fracture. The usual method of attaching the faucets to stoneware vessels is to grind the tapered shank into a tubulure on the vessel having a similar taper. These tapered ends are not interchangeable and in making replacements it is necessary to lap the shank into the outlet, using a carborundum sludge as a grinding medium. This is a simple operation and full instructions are furnished by the manufacturer. A flanged connection is usually preferred for connecting large heavy faucets to stoneware vessels. Such faucets should always be supported independently to prevent any undue strain on the outlet.

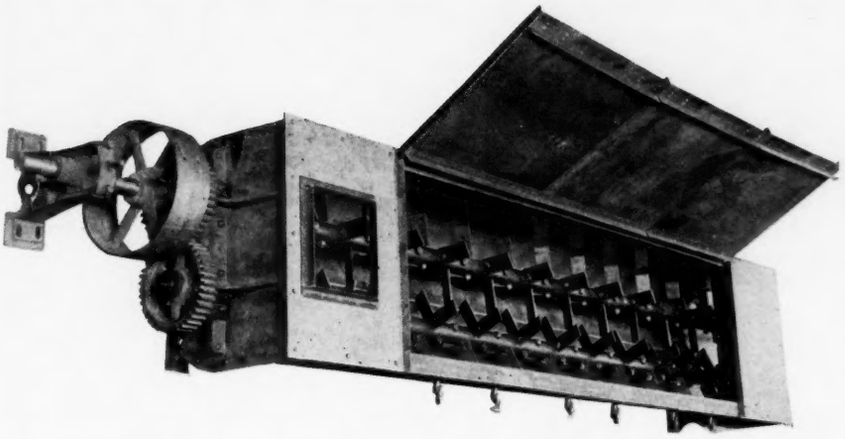
Towers

Attention has already been drawn to the importance of providing packed towers with a solid base. It is no less important to keep it so as any settlement may result in the fracture of some of the sections due to uneven distribution of the load. Consequently, piers on which towers are erected and their foundations should be carefully protected from dripping acid.

In setting up towers with bell and spigot joints care must be taken that each section has a level and even bearing on the section on which it rests. Towers up to about 18 feet high will carry their own weight if not subject to wind pressure but higher towers should be supported under the bell at alternate sections, i.e. at every 5 to 6 feet of height. Packing that is stacked in a tower may, if preferred, be supported on the bottom but packing that is dumped should be supported on perforated plates about every 6 feet or so of height to avoid too great a side thrust on the walls of the tower.

These recommendations for the care of stoneware equipment in installation and service are necessarily incomplete and cover only a few of the more important types of equipment used in the chemical industry, but they may serve in general to illustrate the few points to which attention must be given in order to ensure maximum service.

Obviously a vitrified clay product requires more careful handling than some other materials of construction used in the chemical industry that do not have its unique resistance to chemical attack but the plant superintendent who will cooperate with the chemicalware manufacturer in the design of his equipment and in the selection of the most suitable ceramic body and who will follow a few common-sense principles in the installation and handling of the ware will be amply repaid in low initial cost, negligible maintenance expense, freedom from corrosion and consequently a superior product.



MR. LOCKARD has chosen to devote most of his article to pointing out the differences between mixing and blending and to emphasizing the importance of choosing the proper type of equipment to do certain operations. Maintenance of this type of equipment is largely one of careful lubrication.

The Practical Approach to the Choice of Mixing and Blending Equipment

By C. R. Lockard

Sprout, Waldron Co.

MIXING or blending in one form or another constitutes one of the major operations in the manufacturing and processing of many products in the chemical field. The ever increasing desire and necessity for absolute uniformity of products at lower costs makes careful study of existing equipment to accomplish this efficiently most important.

To approach the problem at hand it must be first determined if the operation is one of simple mixing or one of blending. There is a very distinct difference.

In the simple mixing operation of solids with solids there is only a commingling of materials and each ingredient generally retains its shape, color and other characteristics. For many products this simple commingling is sufficient. Many other products, however, such as oxides, insecticides or spray dust dyes, kalsomines, ceramics and other products that are a combination of two or more finely ground materials demand an absolute marriage of all materials, a perfect distribution of all colorings, a uniform analysis of every part of the finished product. Each ingredient loses its individual identity and by being blended with the others produces a finished material distinct in itself.

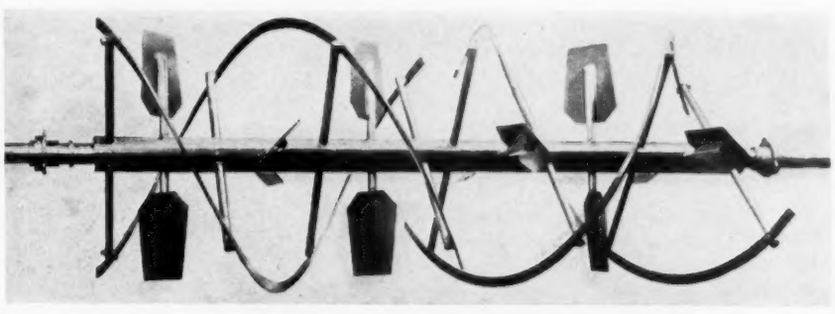
Now how to determine the action you are getting or want to get. A simple test can be made. Take two or more of your products, preferably of different color, and commingle them by rolling them back and forth and turning them over on a sheet of white paper. After thoroughly mixed, take a knife or spatula and draw it over the mixture to form a smooth surface. It will be immediately apparent that color is uneven denoting a mixture, but not a blend.

Next, take the material as it has been premixed and turn it over a few times with the spatula giving it a smooth rubbing action at each turn over and note how the materials soon begin to form into a new appearing product in which the identity of each separate ingredient is lost.

Second consideration when choosing mixing equipment is to give thought to the many problems involved in the handling of different products besides the actual mixing or blending the materials. Can the operation be best accomplished by a batch or continuous system? Is space a controlling item? Which type requires lowest power? Is heating or cooling necessary when handling? Is dust a problem that must be controlled because of danger to health of employees? Does your product demand special construction materials to prevent contamination from rust, oil or to prevent sparking to eliminate explosion hazards? Must mixer be cleaned frequently? How will mixer be loaded and discharged? Will it be necessary to start mixer under full load at all times? Is mixer to be used on material having same weight per cubic foot at all times?

So much for questions that have a most important bearing on getting the right kind of mixing or blending equipment. We are now ready to consider some of the advantages and disadvantages of various types for different kinds of work.

Let us first consider the horizontal batch type shown above. More mixers of this type are in use than all others for it lends itself to so many variations that it can be adapted to more mixing problems than any other. The mixing element in this type of mixer can be of several different types, but for mixing solids with solids it is generally equipped with a combination ribbon and paddle agitator. One set of ribbons carries the material in one direction, while the other carries it in the opposite direction. This movement keeps the entire mass in motion and quickly mixes the ingredients. The equalizing action of the ribbons prevents any end pile up or pressure. When discharge is opened the material is quickly discharged. The outside ribbons carry toward discharge and therefore effect complete discharge because of the close clearance construction. In mixers where cleaning is necessary or contamination from any previous batch must be avoided, care should be taken to secure crevice free, smooth surface agitator—shown below. This type of mixer can be had in capacities ranging from 3 to 550 cubic feet. It can be jacketed for steam or water, provided with air cooling hood or spray nozzles and can be made with case as illustrated or with a cylindrical case to prevent any possible hang of material on sides.



Crevice free combined ribbon and paddle agitator for a horizontal mixer

ADVERTISING PAGES REMOVED

Bearings, too, can be mounted separate from the mixer case or attached directly on the same. They can be of plain or anti-friction types. Of a design that permits construction to meet the demands for handling light or heavy materials, it can be custom built of steel, stainless steel or wood, to definite specifications most economically.

Continuous mixing is a requirement in some plants. For this service, the horizontal double agitator type, see photo below, that has two paddle agitators running in opposite directions, is most frequently used. It permits the feeding of proportioned amounts at various points in the mixing line and has the advantage of delivering thoroughly mixed materials continuously and in large capacities. It can be furnished in one, two or three high units. There is also a combined ribbon and paddle single agitator type and an all paddle type that is provided with hinged watertight drop bottom that is especially adapted to the handling of semi-liquid and viscous mixtures.

Vertical mixers are being used in increasing numbers because of their self-loading, space-saving features and also because they are lower power consumers than the horizontal type. For mixing powdered or granular dry materials like casein, this type has much to recommend it. Diagram above (center column) illustrates this type.

We have described, up to this point, various types of mixers that are primarily used for a very intimate commingling of materials. Some blending action, of course, is achieved, especially in mixers equipped with the combined ribbon and paddle agitator. The ribbons exert a rubbing action to some extent, as do the paddles, when passing through the material with a spatula like action that effects some blending.

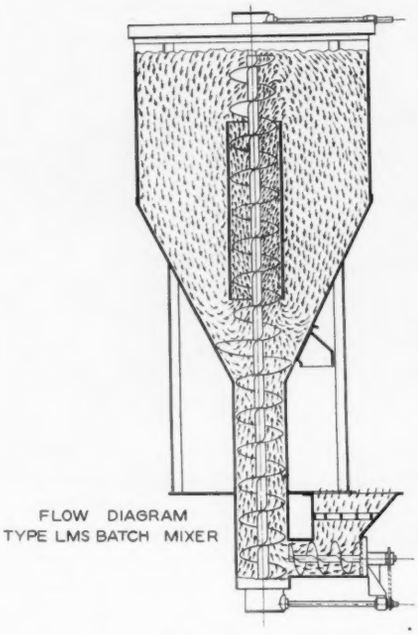
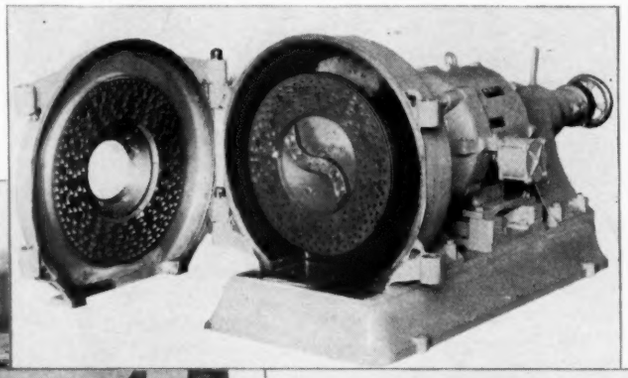


Diagram showing a typical vertical mixer

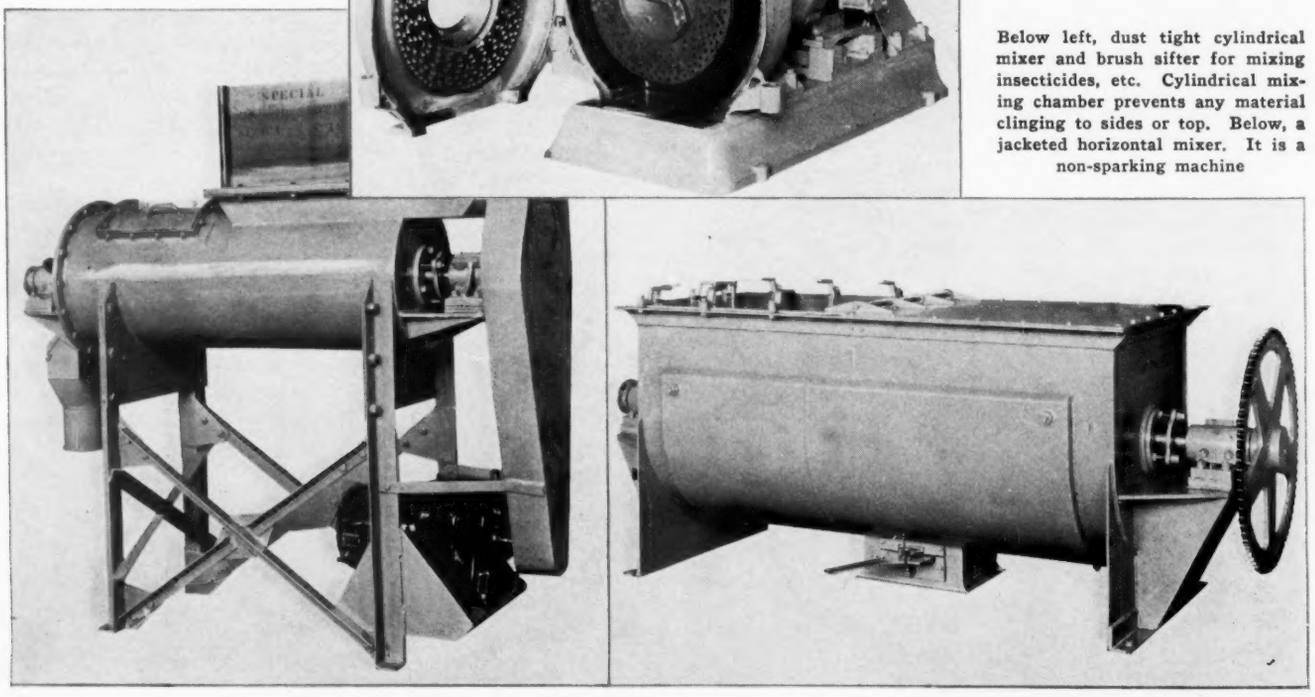
Finely Ground Products

To achieve true blending of very finely ground products, however, requires a much more vigorous spatulating action than a mixer is capable of giving. Recent development of intermeshing plates that can be used on the single disc type grinding mill has proven ideal for giving this a continuous rubbing action so necessary to effect perfect blending. The single disc mill, see photo below, has one stationary head and one revolving head to which are attached alloy plates with intermeshing projections through which the material moves from the eye to the periphery of the plate, receiving a continuous spatulating action that is impossible to equal in any other type of mechanical blender. Because it is continuous it has large capacity, power requirements are surprisingly small and space required to install it is considerably less than equipment generally used for this purpose. For giving that final blend to kalsomines, insecticides, dyes, oxides and other finely ground products where uniformity in color and analysis is essential, this unit is worth careful investigation. The disc blender can be belt or motor driven; it can be adjusted while in motion and can be made dust tight.

Constant research in methods and improvements in equipment for meeting the mixing and blending problems of the process industry is being carried on by manufacturers of this type of equipment. They offer a cooperative study of existing methods in your process to help you determine the possible advantages of modernization.

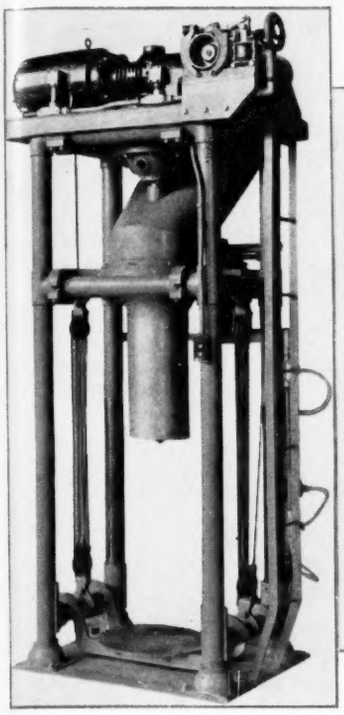


Right, swing head disc blender. Intermeshing plates provide necessary rubbing action to effect perfect blending

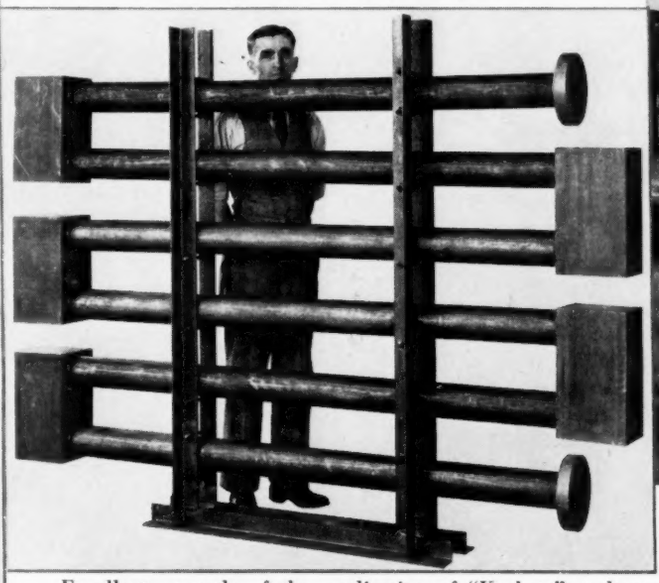


Below left, dust tight cylindrical mixer and brush sifter for mixing insecticides, etc. Cylindrical mixing chamber prevents any material clinging to sides or top. Below, a jacketed horizontal mixer. It is a non-sparking machine

Equipment You Should See at the Chemical Exposition



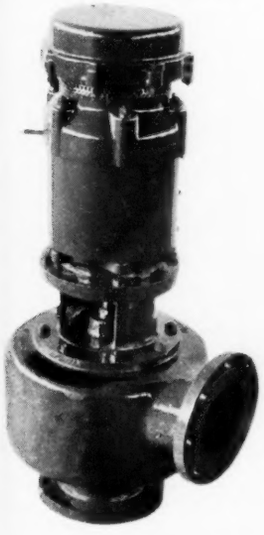
Left, All-Electric Automatic Compression Packer. All the operator does is push a starting button and remove the filled container. Sprout, Waldron, Muncy, Pa.



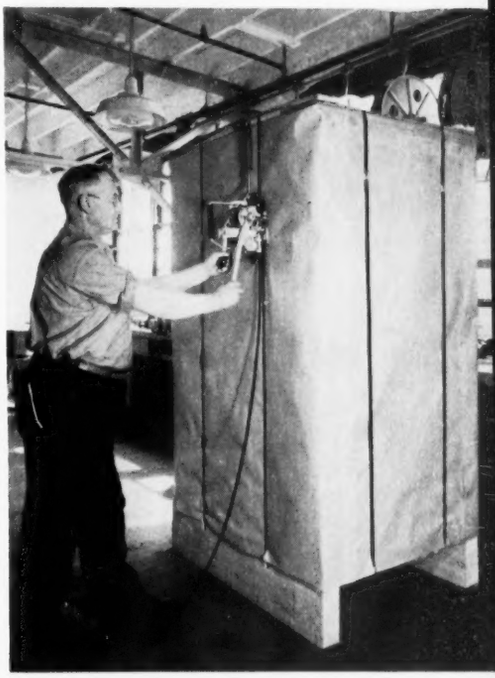
Excellent example of the application of "Karbate" to heat exchangers. Note that provision has been made for the attachment of flanged fittings. National Carbon Company, Cleveland.

See this new Rietz Disintegrator for reduction of dry or wet materials at the booth of H. L. Bullock.

Below, an entirely new pump with a priming control principle that may be designated as "Self-Reactive Hydraulic Balance." The La Bour Company, Elkhart, Ind.

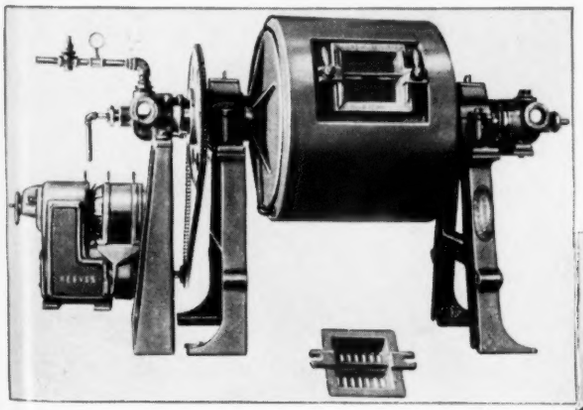


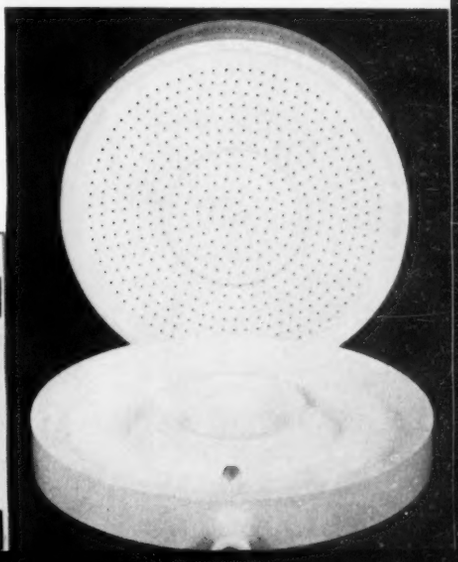
To be demonstrated for the first time is the Acme 200 Series Steelstrapper. This is the first and only 5/8" and 3/4" strapping tool to combine the tensioning, sealing and cutting operations with an automatic seal feed. Acme Steel Co., Chicago.

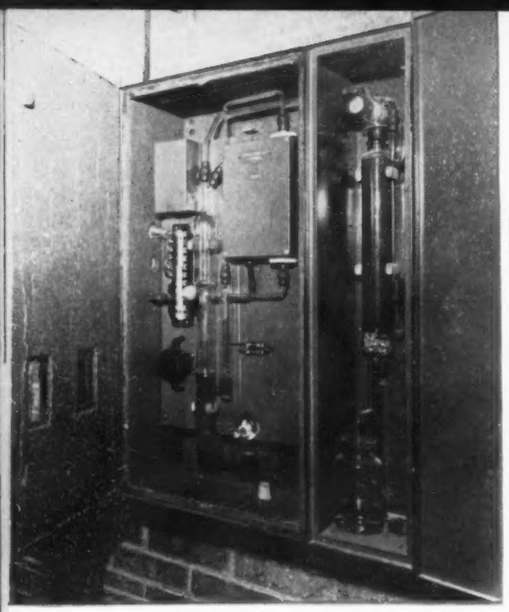


While this cover is more or less a standard item throughout the chlorine industry, its manufacture in hard rubber is unique. American Hard Rubber Co., N. Y. City.

A new pebble or ball mill of welded construction throughout. Mill is jacketed for heating or cooling. Abbe Engineering Co., N. Y. City. Center, an economical means for obtaining accurate control of electric furnaces and ovens without the use of rheostats or transformers, is said to be provided in a new recorder-controller for throttling electric heat recently developed by the C. J. Tagliabue Mfg. Co., Brooklyn, N. Y. Right, the new porcelain vacuum filter, open view. This unit is designed for operation with either vacuum or pressure, unaffected by any acids except hydrofluoric. Lapp Insulator Co., Le Roy, N. Y.

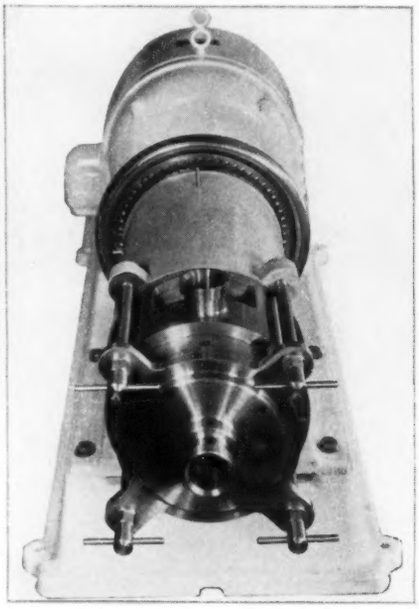


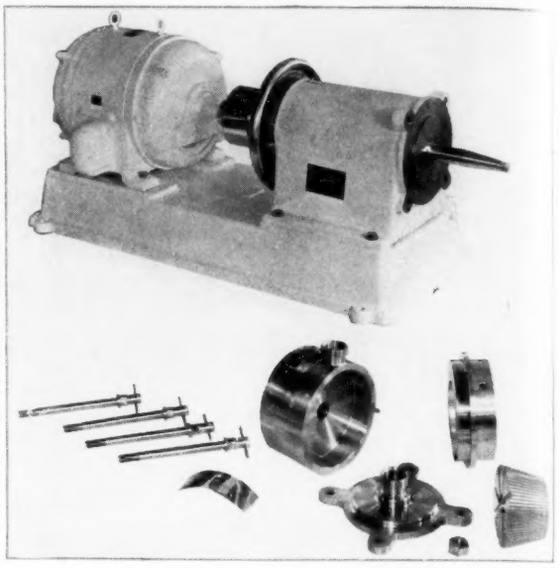




New gas analysis cabinet, featuring all glass-lined construction, no maintenance filter. Leeds & Northrup, Philadelphia, and to be shown at the Chemical Show, Dec. 4-9.

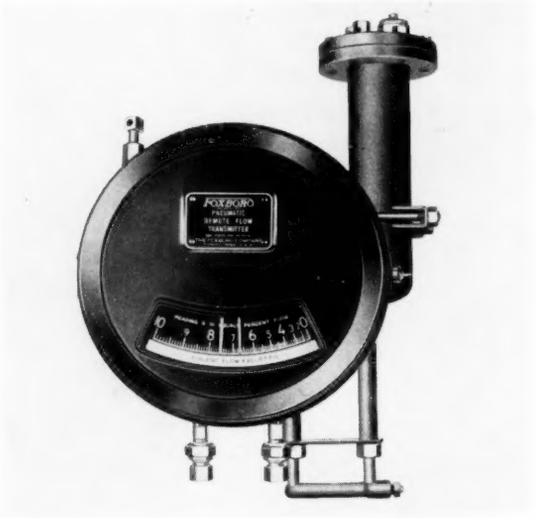
Below, two views of the newly developed Charlotte. This machine is manufactured of stainless steel forgings and is so designed that it can be taken apart, sterilized and re-assembled in a few moments. While it is widely used in the manufacture of ice cream, homogenized milk, cheese, mayonnaise, etc., it is of special interest to chemical and chemical specialty field. Chemicolloid Laboratories, N. Y. City. See it at the Show.

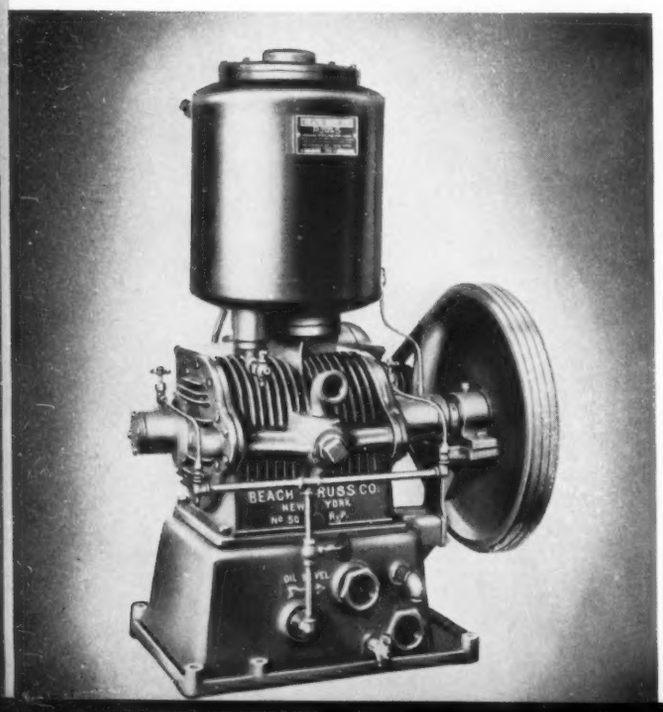




Foxboro will show several new innovations including three types of remote transmission instruments.

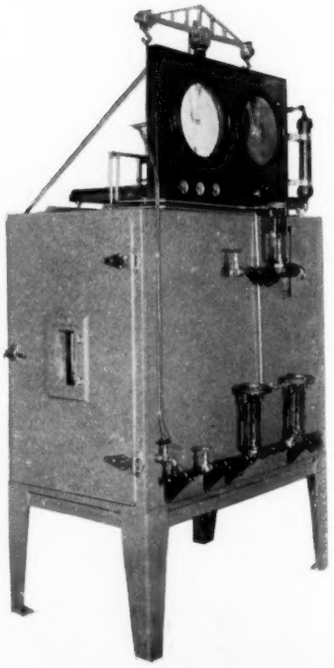
The American Laundry Machinery Co., Cincinnati, will introduce a new laboratory centrifugal.





Left, the Beach Russ New Type R P High Vacuum Pump which was introduced within the past year and which is rapidly being adopted by the process industries for a wide variety of wet vacuum operations. Beach-Russ Company, N. Y. City.

Right, the new "Hurricane" laboratory tray drier—it weighs as it dries. To be shown by the Philadelphia Drying Machinery Co.



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We are hopeful that the substantial reductions which have been made will enable the chemical industry to use these amines to greater advantage in existing applications and in the development of new products and processes.

For a complete schedule of new prices, please write to our nearest sales office.

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PHILADELPHIA CHICAGO NEW YORK

Chemists' Club Greets New Members

Old members greeted new members Oct. 28. At the speakers' table, left to right: Prof. Lincoln T. Work, Columbia; E. L. Luaces, consultant; Howard B. Bishop, president, Sterling Products, and chairman of the membership committee; Prof. Paul M. Giesy, Newark College of Engineering; C. R. Downs, consultant; H. O. Chute, consultant.

Left, seated, R. L. Hartwell, Metal Textile Corp.; Edward A. Turner, International Nickel; and C. S. Kimball, Foster D. Snell, Inc.; above, "Lou" Eckelmann, Pyrene; and "Fred" DeWitt, Parker Rustproofing; right, Herbert J. Kaufmann, Mutual Chemical.

Westinghouse's Dr. L. J. Berberich projects an image of electrons entering a salt crystal. The heart-shaped cloud effect is formed by electrons entering the crystal, which has been heated to a temperature of 1200 degrees Fahrenheit in a special electric furnace. Electrons reveal their presence as a reddish mass, as their vibrations absorb all but the red and violet colors of white light passed through the crystal.

CHECKLIST OF MONSANTO INTERMEDIATES

This chart lists the essential properties of a part of the intermediates manufactured by Monsanto. To obtain the full list, with complete properties and specifications, write for the booklet "Monsanto Intermediates for American Industry." MONSANTO CHEMICAL COMPANY, St. Louis, U. S. A. District Offices: New York, Chicago, Boston, Detroit, Charlotte, Birmingham, Los Angeles, San Francisco, Montreal, London.

INTERMEDIATE	CHEMICAL FORMULA	CRYSTALLIZING** or MELTING* POINT	DISTILLATION RANGE	USES
Benzyl Chloride	$C_6H_5CH_2Cl$	———	175.0°C. to 185.0°C. (95% within 3.0°C.)	Dye intermediate, production of perfume bases, pharmaceuticals, plasticizers, resins, wetting agents, rubber accelerators, gasoline gum inhibitors.
Cyclohexylamine	$C_6H_{11}NH_2$	———	129.0°C. to 136.0°C. (95% within 4°C.)	Dyestuff intermediate, solvent emulsifying agent, insecticide, organic syntheses.
Dichlorphenol 1:2:4	$C_6H_3OHCl_2$	42.0°C. min.**	———	Dye intermediate and germacide.
Dinitraniline 1:2:4	$C_6H_3NH_2(NO_2)_2$	177.5°C. min.*	———	Dye intermediate.
Dinitrochlorbenzene 1:2:4	$C_6H_3Cl(NO_2)_2$	46.5°C. min.**	———	Production of sulfur black, azo dyes, explosives, photographic chemicals.
H Acid	$C_{10}H_4OH{\cdot}NH_2{\cdot}SO_3H{\cdot}NASO_3$	———	———	Dyestuff intermediate, developer.
Metachloraniline	$C_6H_4NH_2Cl$	—10°C.**	228.0°C. to 231.0°C. dry point. (95% within 1.0°C.)	Dyestuff and pigment manufacture.
Monsanto Salt	$C_6H_3CH_3ClNaSO_3$	———	———	Pigment base for printing ink lakes.
Ortho anisidine	$C_6H_4{\cdot}OCH_3{\cdot}NH_2$	4.8°C. min.**	223.0°C. to 226.0°C. (95% within 2.0°C. min.)	Component of azo dyes.
Orthochloraniline	$C_6H_3NH_2Cl$	—4.5°C. min.**	206.5°C. to 211.5°C. (96% within 3°C.)	Dye intermediate.
Orthochlorphenol	C_6H_4OHCl	———	173.0°C. to 177.0°C.	Preparation of alizarines, pyrocatechol, and various organic syntheses.
Orthonitraniline	$C_6H_4NH_2NO_2$	70.0°C. min.*	———	Dyes, dry colors, lakes & toners.
Orthonitrochlorbenzene	$C_6H_4ClNO_2$	31.7°C. min.**	———	Dye intermediate.
Orthophenetidin	$C_6H_4NH_2OC_2H_5$	—4°C. **("seeding" necessary)	230.5°C. to 233.5°C. (95% distills within 2°C. max.)	Dye intermediate.
Parachloraniline	$C_6H_4NH_2Cl$	69.5°C. min.**	229.0°C. to 233.0°C. (95% within 1.5°C.)	Dye intermediate.
Paranisidine	$C_6H_4OCH_3NH_2$	57.2°C. min.**	240.0°C. to 243.0°C. (95% within 2°C.)	Component of various azo dyestuffs.
Parachlorphenol	C_6H_4OHCl	42.0°C. min.**	218.0°C. to 222.0°C.	Preparation of hydroquinone, pharmaceutical derivatives and quinzarine.
Paranitrochlorbenzene	$C_6H_4ClNO_2$	82.5°C. min.**	———	Synthesis of dyestuff intermediates.
Paranitrophenol	$C_6H_4OHNO_2$	112.0°C. min.*	———	Dye intermediate, photographic chemicals, leather tanning.
Paraphenetidin	$C_6H_4NH_2OC_2H_5$	4.0°C. min.**	248.0°C. to 251.0°C. (95% distills within 2°C. max.)	Dye intermediate.
Paratoluenesulfonchloride	$C_6H_4CH_3SO_2Cl$	65.5°C. min.**	———	Organic condensing agent, preparation of esters as alkylating agents, used in selective dyeing of rayon fabrics and in manufacturing of synthetic tanning materials.
Phenol	C_6H_5OH	40°C. min.**	———	Dyes, resins, explosives, synthetic tanning materials, pharmaceutical antiseptics, deodorants.
Phthalic Anhydride	$C_6H_4(CO)_2O$	131.0°C. min.**	———	Dye intermediates, dyes, perfumes, pharmaceuticals, plasticizers, resins.
Salicylic Acid, Technical	$C_6H_4OHCOOH$	158°C. min.*	———	Dye manufacture, preservative for glues and leather.
Sulfuryl Chloride	SO_2Cl_2	———	———	Chlorinating agent.

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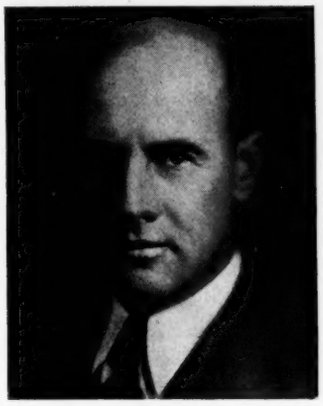
News Review of the Month

I.A.C. ENTERS POTASH FIELD

Plant, Near Carlsbad, Will Be Ready Next Summer—Development Work Has Been Carried On For Three Years—15,000 Acres Leased From Government—American I. G. Announces Change of Name—

ON Nov. 1, International Agricultural Corp., N. Y. City, made public plans for the expenditure of about two and a half million dollars for the mining and processing of potash minerals near Carlsbad, N. M. The plant, to be capable of turning out 70,000 tons of potassium sulfate and an equal amount of 60% muriate of potash annually, will be in production next summer.



LOUIS WARE

I. A. C.'s new president makes important potash announcement.

The scene of operations is on about 15,000 acres of land leased from the government. These deposits, consisting of salt at a depth of about 400 ft. and potassium chloride at a depth of approximately 1,000 ft., are estimated as sufficient to last 40 years or so, at the rated capacity of the works. The development work, which has been going on during the past three years, is being carried out by the Union Potash and Chemical Co., International Agricultural subsidiary. The New Mexico plant will eventually produce a number of by-product chemicals, in addition to the manufacture of any grade or type of potash salt, either as such or in combination with soluble magnesium salts.

This development, according to Louis Ware, president of International Agricultural, will provide the first mine producing potassium sulfate direct from native ores in the United States. Mr. Ware also said that "under present war conditions, with importations greatly lessened, there is an opportunity for the new potash project of International to gain quickly its place in the industry. The company does not consider this a temporary project, but has based its estimates for this investment on normal conditions."

Financial Aspects

International has sold $1,208,000 par amount of its first mortgage and collateral trust 5% bonds to the New York Trust Co. on an annual interest basis of 3½%. Proceeds will be used as an additional investment in the Union Potash and Chemical Co., in which International holds a controlling interest. Mr. Ware stated that, as announced in the recent annual report to the shareholders, plans for revamping the company's capital structure are being developed and that a proposal may be submitted to the stockholders in the near future.

Seek Strategic Materials

The Bureau of Mines has engineering parties in the field investigating the possibilities of 8 mineralized areas in the West. This action was taken in accordance with the provisions of the Strategic Materials Act, authorizing the Bureau to appraise ore deposits containing such metals as might be designated as strategic by the Secretaries of War, and Navy, and the Interior upon the advice of the Army and Navy Munitions Board.

Deposits now being examined include antimony, chromium, manganese, tin, mercury, nickel, and tungsten. The field engineers are working in close cooperation with the U. S. Geological Survey, which has already done extensive geological investigation of the ore bodies in question.

According to the Bureau of Mines, since the World War the strategic minerals situation of the U. S. has been improved in some respects only to become more aggravated in others. The nation is now better off in regard to nitrates, potash, platinum, molybdenum, vanadium, and antimony than it was a quarter-century ago. However, the Bureau reports that the rapid increase in the use of alloys has made us more dependent than ever upon foreign sources of manganese, chromium, and nickel, and that, since 1923, much of our aluminum ore has come from South American bauxite deposits. At the present time, strategic minerals stocks are said to be ample and no immediate shortages are anticipated.

Important Name Change

American I. G. has taken the name of General Aniline & Film Corp., and has merged in the new corporation its subsidiary, the former General Aniline Works, Inc. General Aniline will operate as General Aniline Works Division, General Aniline & Film Corp. The new corporation will have its offices at 230 Park ave., N. Y. City. General Aniline Division, with plants in Linden, N. J., and Rensselaer, N. Y., will continue under the same management as heretofore.

Officers of the new organization, chosen at a meeting of the board of directors last month, include D. A. Schmitz, president; H. S. Williamson, vice-president and treasurer; W. H. vom Rath, vice-president and secretary; and R. Hutz, vice-president and general manager of General Aniline Works Division.

Nitrogen Cartel Through?

It is reported that the International Nitrogen Cartel, comprising all the European synthetic nitrogen producers and the Chilean nitrate industry, will be shortly disbanded, the first of the commodity regulation plans to be abolished as a result of the war.

New Trade Treaty

On Oct. 20 was made public the government's intention to negotiate a reciprocal trade agreement with Uruguay, at which time a list of products that will be affected was issued. This list includes linseed oil, tallow, oleo stearin, dried blood, tankage, and other nitrogenous materials, on which the U. S. will consider granting concessions.

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CHEMICALS INDISPENSABLE TO INDUSTRY

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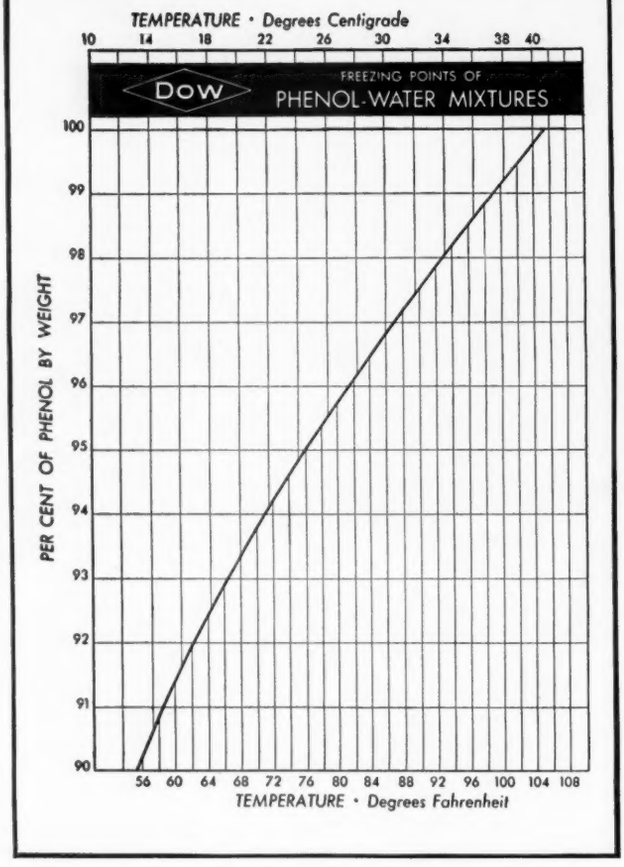
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FREEZING POINTS OF
PHENOL-WATER MIXTURES
PER CENT OF PHENOL BY WEIGHT
100 99 98 97 96 95 94 93 92 91 90
56 60 64 68 72 76 80 84 88 92 96 100 104 108
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A Perfect Party

A GOOD turnout and fine weather marked the fourth annual Fall meeting of the Drug, Chemical and Allied Trades Section of the New York Board of Trade, in Skytop, Pa., on Oct. 20 and 21.

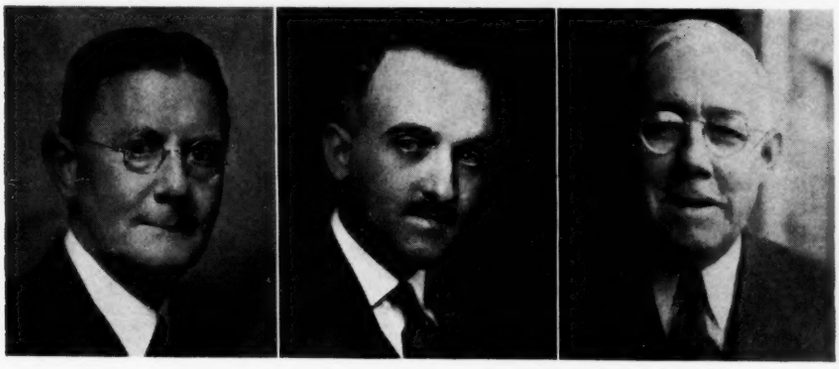
Speakers at the two-day meeting included Dr. Terry Townsend, president of the Medical Society of the State of New York, Dr. J. Frederic Dewhurst, economist of the Twentieth Century Fund, Dr. Amos E. Taylor, Division of Finance, U. S. Dept. of Commerce, and Edward C. Acheson, professor of Finance, George Washington Univ. Dr. Townsend, the first speaker at the opening business session, chose as his subject, "Has the Citizen Abdicated?" On Saturday afternoon, Dr. Dewhurst presented the results of a survey he has made on "Are Distribution Costs Excessive?"; Dr. Taylor discussed "Current Business Economics." Following the banquet Saturday evening, Professor Acheson spoke on "Economic Comparisons—1914 and 1939."

An unexpected bit of business was presented by Philip M. Dinkins, American Cyanamid & Chem. Corp., with regard to an action of the parent organization in adopting a resolution not in favor of a move calling for inclusion in congressional action on the neutrality law of full recognition of an item in the merchant marine acts. This item provides that shipping services should be provided "on all routes essential for maintaining the flow of such domestic and foreign waterborne commerce at all times." The DCAT section's executive committee had challenged the vote as not properly taken and not representative, inasmuch as only 21 of the "big board" had voted upon the measure. However, Mr. Dinkins explained that they had been successful in having the directors' action rescinded, and that this measure has been laid before the entire membership of the New York Board of Trade.

Ralph ("Doc") Dorland, Dow Chemical, general chairman of the Fall meeting, and Class B low man in the regular feature of the Skytop week-end, the golf tournament, was assisted by John A. Chew, chairman of the reception committee, S. B. Penick, Jr., chairman of the "Get Acquainted Party" committee, and Robert B. Magnus, chairman of the transportation group.

A new feature of the Skytop conference was the "Friday-Night Party," arranged by Turner F. Currens, in which non-golfers were granted special recognition in the form of games, with prizes and all.

At the highly successful Skytop party, the ladies—"God Bless Them," left to right, Mrs. Gordon MacKelcan, Mrs. Ira Vandewater, Mrs. W. F. George; next, Robert H. de Greeff; to the right, A. A. Wasserscheid, Mallinckrodt, in his role of seeing that the ladies had a good time. Cameraman A. A. Teeter, Chas. Pfizer & Co.



D C A T Officials at Skytop

Left to right, John Chew, well-known chemical dealer, chairman of the Reception Committee; "Bill" Barry, Mallinckrodt, chairman of the Section; and "Doc" Dorland, Eastern Dow sales manager, vice-chairman, and who was in charge of general arrangements for the Skytop party.

Robinson at the Show

Robinson Manufacturing Co., Muncy, Pa., will occupy Booths 30 and 31 at the Chemical Exposition at the Grand Central Palace, N. Y. City, week of Dec. 4-9.

Exhibit will consist of Roller Bearing Saw Tooth Crusher—Screen Type Pulverizer—Large and Small Heavy Duty Knife Cutters—Rubber Grinder with Built-In Motor and Cooling Jacket—Motor Driven Heavy Duty Hammer Mill—Double Deck Gyro-Sifter—Batch Mixer of Stainless Steel Construction with Brush Sifter—Vertical Screw Elevator—Screw Conveyors.

The knife cutters are of heavy steel construction. They are of recent design, with new features that insure ease of inspection and adjustment of knives. The rubber grinder is the newest and most modern of its type. It is sturdily constructed, has built-in motor, and has most effective cooling system.

The stainless steel mixer, double deck-gyro-sifter, vertical screw elevator, and conveyors will be combined into an operating unit which will demonstrate the effectiveness of Robinson Equipment for thorough mixing, accurate sizing, and efficient handling of products. The pulverizer and hammer mill embody new and improved features that increase the efficiency and operating convenience of impact type mills.

Canadian Chlorine Plant

Canadian Industries, Ltd., has put into operation its new chlorine plant at Shawinigan Falls. Company has already broken ground for the erection of a caustic soda unit there, and hopes to have it ready for operation by early spring.

Now Calco Division

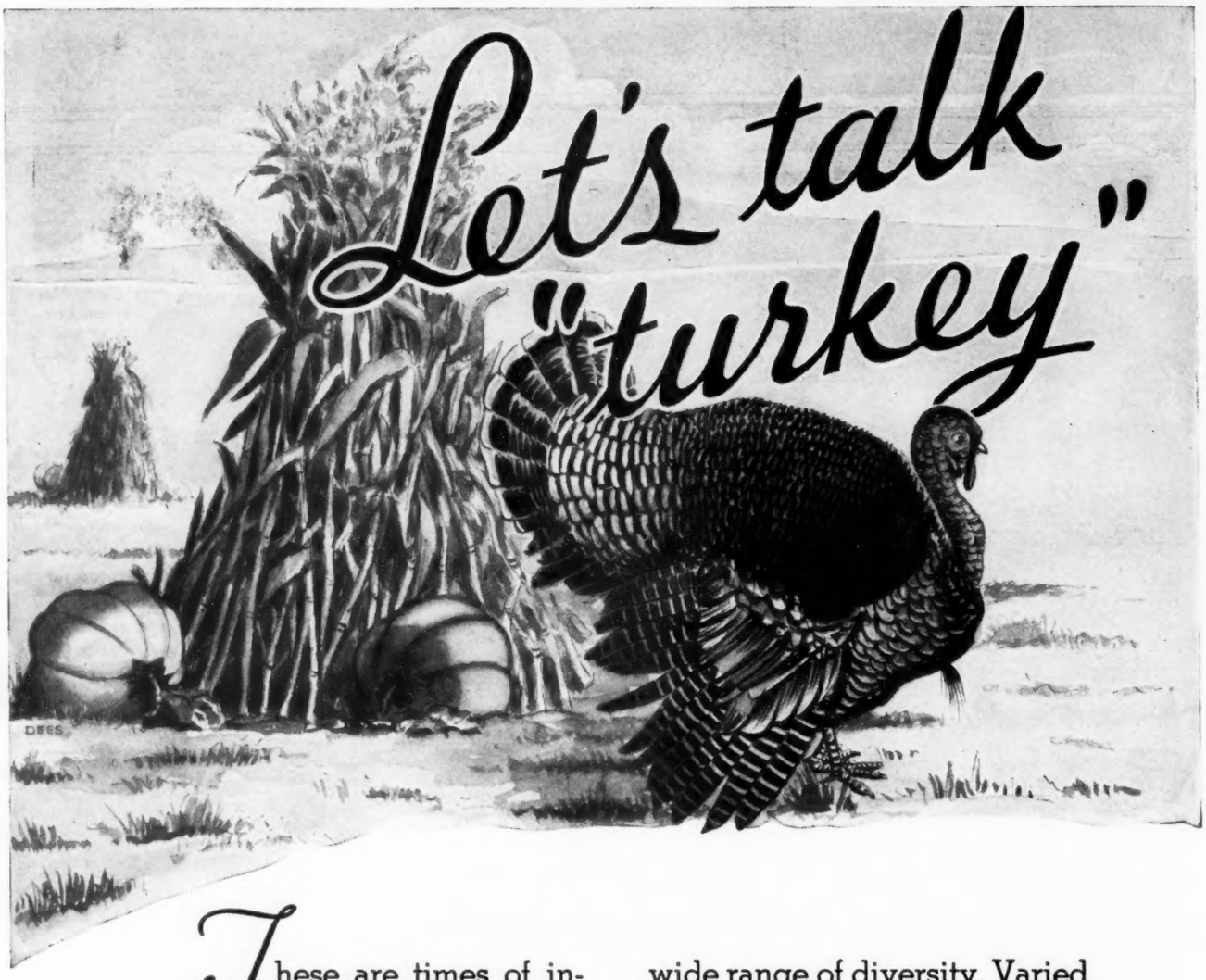
The Calco Chemical Company which, since 1929, has been a wholly owned subsidiary of American Cyanamid Co., ceased to be a separate corporation as of Nov. 1, and is now operating as Calco Chemical Division, American Cyanamid Co. Calco continues with a separate organization for manufacture, sales, service, etc., at Bound Brook, N. J., no changes in management, personnel or policy are contemplated.

Koppers To Erect Plant

Pittsburgh Coke & Iron Co. has let a contract to Koppers Co., Pittsburgh, for the erection of a hydrogen sulfide plant recovering sulfur in its coke oven gas. Chemical Construction Co. has been granted a contract to build for Pittsburgh Coke a sulfuric acid plant, the output to be used in company's ammonia sulfate production.

Markley Appointed

Dr. Klare S. Markley has been made principal chemist in the Oil, Fat, and Protein division of the Southern Regional Research Laboratory, New Orleans. He has been a chemist for the Dept. of Agriculture since 1921; for the past 2½ years, he has been in charge of the Oil section, U. S. Regional Soybean Industrial Products Lab., Urbana, Ill.



These are times of increased tempo in production—times that call for effective materials and processes—times that provide the chemical industry with a welcome aid, Standard Silicates.

● For use in textile finishing, metal cleaning, water-treating, soap-making, corrugated box manufacture, concrete-hardening, etc., these silicates are ideal.

● Standard Silicates cover a wide range of diversity. Varied physical and chemical properties adapt them to an ever-increasing number of industrial processes, and new uses are constantly being discovered for Standard Metasilicate, Orthosilicate and Liquid Silicates.

● It may be that one of these Standard Silicates is the answer to *your* problem of speeding production, improving product quality or effecting greater economies!

C-5

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Standard Silicate Division
General Offices · PITTSBURGH, PA.
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Heavy Chemicals

Alkali, Chlorine Prices Unchanged for '40

Bichromate Quotations Renewed for Next Year—Di- and Trisodium Phosphates Advanced—Chemical Manufacturers Taking Care of Legitimate Needs of Regular Customers—

WHEN the time came for announcing '40 contract prices last month chemical manufacturers gave ample indication that their earlier statements concerning intentions to hold down any increases to an unavoidable minimum were not merely idle talk. Included in the long list of important industrial chemicals unchanged in price for '40 were ash, caustic, bleaching powder, chlorine, "bicarb," sal soda, bichromates, oxalic acid, etc.

One of the first important contract announcements came Oct. 23 when Solvay announced that it was writing contracts for ash and caustic. No change was made in carlot or l.c.l. prices. The carlot prices, f.o.b. seller's works are as follows:

Soda Ash, 58%

	Per 100 lbs.
Light, bulk	$0.90
bags, paper	1.05
bags, burlap	1.08
barrels	1.35
Extra light, bulk	.90
bags, burlap	1.08
barrels	1.45
Dense, bulk	.95
bags, burlap	1.10
barrels	1.35

Caustic Soda, 76%

Solid, drums	2.30
Flake, drums	2.70
barrels	2.95
Ground, drums	2.70
barrels	2.95
Powdered, drums	2.70
barrels	2.95
*47-49% liquid, seller's tank cars	1.95
*buyer's tank cars	1.925
*70% liquid, seller's tank cars	2.00
*buyer's tank cars	1.975

* Basis 76% Na_2O.

On the same day Solvay also reported no change in its quotations for chlorine in single or multiple unit tanks. Quotations f.o.b. seller's plant are as follows:

Single unit tank cars	$1.75
Multiple unit containers—	
3 cars or more	1.90
2 cars	2.15
1 car	2.60

Innis, Speiden, N. Y. City, through its Isco Chemical Division, announced late last month that it was prepared to take bleach contracts on the same price basis as last year.

Company offers its "Isco Brand" chloride of lime, 35 to 37% available chlorine, in carload lots at the following prices:—

	Per 100 lbs.
In 800-pound drums	$2.00
333-pound drums	2.25
100-pound drums	2.85

In less than carload lots, 5 packages and more, the prices are 25c per 100 lbs. above the carlot schedule; for less than 5 packages, the prices are 50c per 100 lbs. above the carlot schedule.

Important Price Changes

	Oct. 31	Sept. 30
ADVANCED		
Aluminum sulfate, iron-free	$1.45	$1.30
Ammonia, aqua, drs.	.02¼	.02
Ammonium nitrate, bgs.	4.35	3.85
Arsenic, red	.18	.16¼
Barium hydrate, imp.	.06½	.05
Calcium acetate	1.90	1.75
Cobalt oxide	1.84	1.65
Cobalt sulfate	.65	.59
Copper acetate	.22	.21
Copper carbonate	.169	.165
Copper chloride	.18	.16
Copper sulfate	4.75	4.60
Disodium phosphate, anhyd.	5.15	4.53
crystal	2.10	1.85
Magnesium silica fluoride	.11	.10
Manganese sulfate, anhyd.	.08	.07
Potassium metabisulfite	.18	.16
Potash, prussiate, red	.35	.29
Strontium carbonate	.24	.22
Trisodium phosphate	2.25	2.00
DECLINED		
Tin tetrachloride	$0.27	$0.30

All prices are f.o.b. Niagara Falls, freight equalized with Wyandotte, Mich., and are subject to the customary 3 months' adjustment clause. Terms are 30 days net, or less 1% for cash in 10 days.

Ed Kassing, foreman of the Warehouse and Shipping department, Monsanto's plant at Monsanto, Ill., has been playing with fire with good results. He has developed a new branding unit for marking the hundreds of carboy boxes handled through his department. Kassing worked out the idea because he felt that too much time was wasted in heating and reheating the brand for each box. Here's how it works: the brand is raised slightly and held in position by a pin through the shaft; blowtorch burns, brand heats, pin is removed, brand descends on box, scorches, is raised again to heat while operator moves to next box. All very simple and very efficient.

On Oct. 19, Warner Chemical announced a higher schedule of prices for anhydrous and crystal disoda and also for trisodium phosphate (crystals). These two particular items have been subject to extremely heavy competition for several years and an advance was not entirely unexpected. The Warner price-list was as follows:

Disodium Phosphate
(Commercial Anhydrous)
Granular or Powdered

	Prices per 100 pounds		
	Bags	Barrels	Kegs
Less carload	$6.10	$6.30	$6.80
Carload	5.15	5.35	5.85

F.o.b. Carteret, N. J., but freight equalized with Marcus Hook, Pa.; Grasselli, N. J.; Chicago Heights, Ill.; Joliet, Ill.; Wales, Tenn., and/or East Chicago, Ind., and Anniston, Ala.

Disodium Phosphate
(Crystal)

	Prices per 100 pounds		
	Bags	Barrels	Kegs
Less carload	$2.50	$2.70	$3.20
Carload	2.10	2.30	2.80

F.o.b. Carteret, N. J., but freight equalized with Anniston, Ala.; Chicago Heights, Ill.; Joliet, Ill.; East Chicago, Ind.; Grasselli, N. J.; Wales, Tenn., and/or Marcus Hook, Pa.

Trisodium Phosphate
Fines, Coarse, Medium

	Prices per 100 pounds Cartons or		
	Bags	Barrels	Kegs
Less carloads	$2.65	$2.85	$3.35
Carloads	2.25	2.45	2.95

F.o.b. Carteret, N. J., but freight equalized with Anniston, Ala.; Grasselli, N. J.; Warner's, N. J.; Marcus Hook, Pa.; Chicago Heights, Ill.; Joliet, Ill.; Wales, Tenn., and Charleston, S. C.

The demand of consumers for immediate shipments of industrial chemicals expanded rather than contracted in the past 30 days. The various announcements indicating that many important products will not be quoted higher did have some beneficial effect for users then felt that it was less vital to acquire large backlogs of materials. It has been very difficult to acquire spot stocks either for domestic consumption or for export. Producers, however, are taking care of their regular customers' normal requirements. A tight situation over the balance of this year and well into the next seems inevitable.

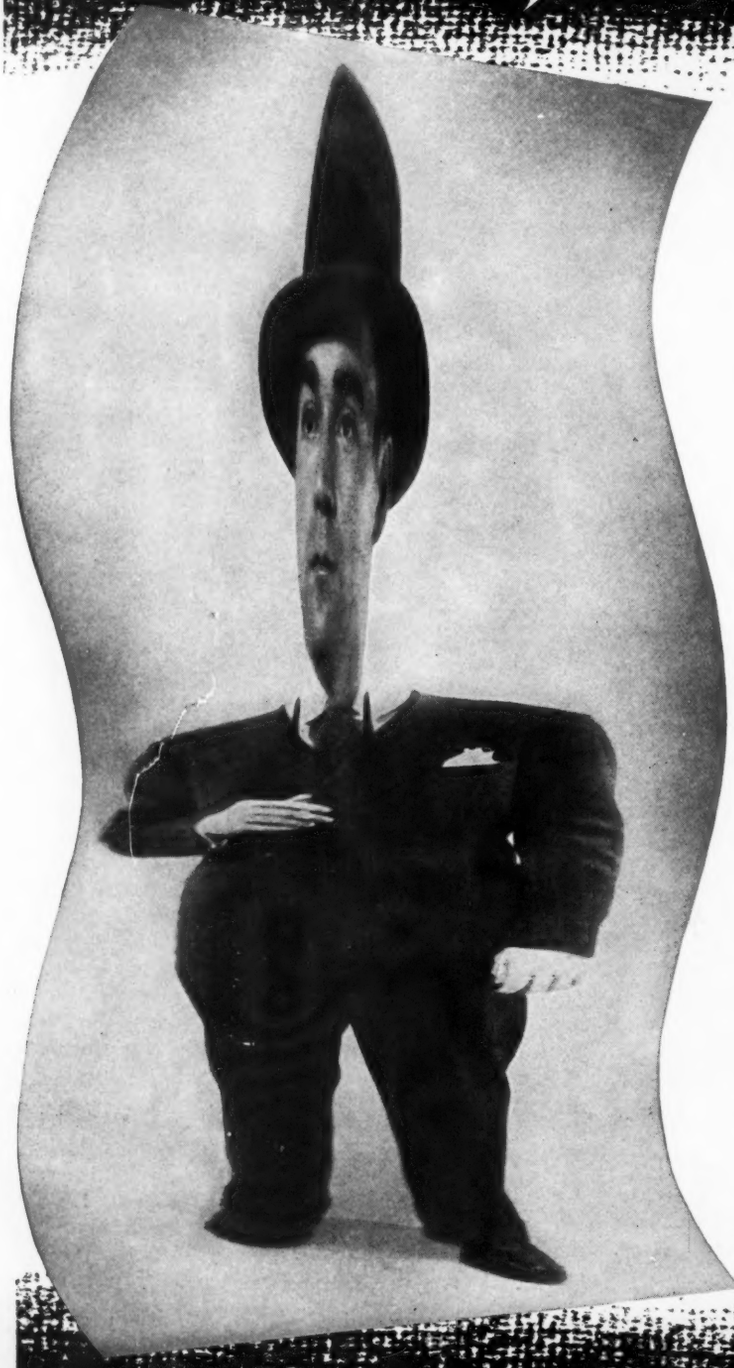
Austin Builds New Dow Unit

A quarter of a million dollars is to be spent on the Pittsburg, Calif., plant of Great Western Electro-Chem. Division, Dow Chemical Co. Contract, awarded to the Austin Company, Cleveland, calls for installation of equipment to increase the chlorine capacity by 15%, as well as modernization and enlargement of the present manufacturing facilities at Pittsburg.

Cohen in New Quarters

Harry Cohen, Atlanta (Ga.) dealer in chemicals, drugs, and oils, has moved from the Candler Annex to new offices at 982 Virginia ave., Atlanta.

STRAIGHT FACTS.. WITHOUT DISTORTION



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News of the Specialties

¶ National Pest Control Group Holds Highly Successful Meeting—Disinfectant Makers to Celebrate Silver Anniversary Meeting at Mayflower Hotel, Washington, Dec. 4-5—

Four hundred or more members and guests of the National Pest Control Association attended the Association's seventh annual meeting at the Hotel Pennsylvania, N. Y. City, Oct. 23-25.

One of the most important resolutions adopted by the convention was that favoring increased appropriations by the Federal government for research in the control of household insects. This move was prompted by the address of Dr. P. N. Annand, assistant chief of the Bureau of Entomology and Plant Quarantine, who said that, despite the $50,000,000 lost through termites, the Federal appropriation amounted to only $11,400 for study of this problem—despite the fact that the government spends about $2,000,000 every year for general research on insects.

Highlights of the meeting were the "Roving Clinic," in which member companies showed various methods for keeping office records, for preparing effective advertising, etc., and the afternoon session devoted largely to chemistry and pest control. Dr. R. C. Roark, senior entomologist, Insecticide Division, Bureau of Entomology and Plant Quarantine, addressed the latter meeting on the "Importance of Chemistry in Pest Control." Dr. C. L. Williams, assistant surgeon-general, U. S. P. H. Service, spoke, at another afternoon session, on "Analysis of Accidents and Precautions To Be Observed," later participating in the very lively Clinic on Fumigation.

NAIDM at Washington

The National Association of Insecticide and Disinfectant Manufacturers celebrates its silver anniversary next month, in Washington, D. C. The annual meeting will be held Dec. 4-5 at the Mayflower Hotel. A very large registration is expected for this convention, at which will be held the annual election of officers.

News of the Specialty Houses

Black Flag Co., Baltimore disinfectant manufacturer, has been purchased by the A. S. Boyle Co., subsidiary of American Home Prods. Co., Jersey City. N. J.

Carroll Chem. Corp., Baltimore, has moved to larger quarters at 420 W. Camden st. Company manufactures general cleaning supplies and cosmetic preparations.

Matrix Contrast Corp., N. Y. City, has acquired a controlling interest in Duryea Prods. Co., Inc., Jersey City, N. J. Latter firm manufactures and sells a number of popular products, including cleaning fluid, belt and wood dressings, disinfectants and insecticide. Lon S. Landers, formerly vice-president of White Tar Co., N. Y. City, is president of the new organization.

Madison Glue Co., Madison, Ind., plans to increase its productive capacity of 1000 tons of glue annually by a substantial amount, and will soon erect a new manufacturing unit on its present grounds.

International Chem. Co., Seattle, has reduced its capital to $50,000. Company was originally authorized at $250,000.

Archer Chem. Co., Chicago, has been granted a charter to sell and buy chemicals, with a capitalization of $3,000.

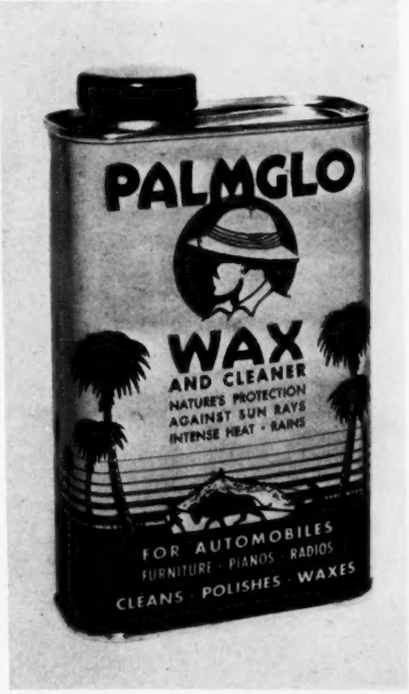
Moyer Appointed

H. E. Moyer has been appointed Los Angeles representative for Hanson-Van Winkle-Munning, Matawan, N. J., manufacturers of electroplating equipment and supplies, with offices at 4324 S. Normandie ave., Los Angeles.

F. T. C. News

Federal Trade Commission issued orders last month against four salt companies prohibiting them from disseminating misleading claims in the sale of salt designed for curing and flavoring meats. The firms named are Jefferson Island Salt Co., Louisville, Ky.; Morton Salt Co., Chicago; Carey Salt Co., Hutchinson, Kans.; and Avery Salt Co., Scranton, Pa.

White King Soap Co., Los Angeles, was charged, in a complaint issued Oct. 20 by the Federal Trade Commission, with the dissemination of misleading representations in the sale of "White King Granulated Soap" and "White King Toilet Soap." Commission holds that company made excessive claims for these products.



The Arrow Products Co. has been founded in Philadelphia to manufacture Palmglo wax and cleaner, a new treatment for automobile finishes and fine furniture.

Refuses Review

The U. S. Supreme Court has refused to review a patent controversy between Colgate-Palmolive-Peet and B. W. Coltman over a patent for the manufacture of soap chips. A lower Federal court held the Coltman patent valid and infringed by the company, but the Circuit Court of Appeals held 7 claims of the divisional patent to be outside of the invention disclosed in the original application, and the Supreme Court declined to review this decision.

Plastics Division Honored

Monsanto's Plastics Division, Springfield, Mass., has been honored by the Associated Industries of Massachusetts for developing two new types of plastic materials first marketed during 1939. Monsanto has been selected for Merit Awards for the development of polyvinyl acetal resins for making the new high-test automobile safety glass, and for similar work in distributing a new type of plastic molding material, polystyrene.

Moves L. A. Office

Stauffer Chem. Co. has transferred its Los Angeles office to 555 S. Flower st., Los Angeles.

Grote Honored

F. C. Grote, president, Globe Chem. Co., Cincinnati, was honored on Oct. 4 at a testimonial luncheon, on the occasion of his golden wedding anniversary.

Morgan in Mexico

Dr. Arthur E. Morgan, former chairman of the T. V. A., is in Mexico to inspect possible sites for settlements for Jewish and other refugees from the warring European countries, on behalf of the Friends' Service Committee of Philadelphia, and the Mexican government.

Waldo With Smith Chemical

Edward M. Waldo, formerly of E. M. & F. Waldo, Inc., dry color manufacturers and importers, has joined the sales staff of Smith Chemical & Color Co., Brooklyn, N. Y.

Stauffer CHEMICALS

STAUFFER CHEMICALS

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LIQUID CHLORINE

Stauffer offers a dependable supply of Liquid Chlorine to large tonnage users. Available in 16 or 30-ton tank cars, Stauffer Liquid Chlorine is of unquestioned quality and reflects the experience and specialized knowledge of Stauffer's technical staff.

OTHER STAUFFER PRODUCTS

BORIC ACID : CARBON TETRACHLORIDE : BORAX : TITANIUM TETRACHLORIDE : SULPHUR CHLORIDE : SILICON TETRACHLORIDE : CREAM OF TARTAR : SULPHURIC ACID : SULPHUR : TARTARIC ACID WHITING : TEXTILE STRIPPER : CAUSTIC SODA : NITRATE OF POTASH CARBON BISULPHIDE

STAUFFER CHEMICAL COMPANY

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SOLVENT NEWS

Reg. U. S. Pat. Off.

November ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1939

1940 Cars Will Use Both Nitrocellulose And Synthetic Resins

Wider Use of Flexible Finishes Seen For Parts Subject to Vibration

Nitrocellulose lacquers and synthetic resin finishes will both get their share of the spotlight when the 1940 passenger car models make their appearance on the roads. No sharp trend is seen this year toward either type of finish. Among the leading car makes, Chrysler, Ford, Mercury, Lincoln-Zephyr, Nash, and Willys will use synthetic resin finishes. All General Motors units, Hudson, and Packard will be finished with conventional lacquers. Studebaker divides its line, using synthetic resins for Champions and nitrocellulose for Commanders and Presidents.

Trucks Use Synthetic Resins

In the field of truck production, the synthetic resins will be used almost exclusively. Synthetic base undercoats will be widely used under the synthetic finishes, and in some cases under nitrocellulose lacquers as well.

An interesting trend is seen in the use of larger quantities of flexible finishes, particularly on parts that are subjected to accidental distortion, constant vibration, or intermittent abrasive action.

Finishes other than lacquers are receiving increased attention, too. Some work is being done on the plating of black cadmium coatings on hardware, and plastic coatings are also being studied experimentally for this purpose.

A handy data sheet has been prepared on the properties of Ansol PR, an anhydrous alcohol blend having many solvent applications. Copies of this chart may be obtained free of charge from U.S.I. Ask for Bulletin AP.

New Developments Responsible For Increasing Solox Demand

U.S.I.'s Alcohol-Type General Solvent Finds Use in Many Lines, Including Manufacture of Adhesives, Cleaning Fluids, Lacquers

The market for Solox, U.S.I.'s proprietary alcohol-type solvent, continues to expand with the discovery of new applications made possible by its versatility. Since its introduction by U.S.I., Solox has not only displaced other alcohol products in many solvent applications, but has greatly broadened its field of usefulness through its entry into new lines.

Truck Fuel Oil Tanks

One of the most interesting of the newer uses for Solox is in Diesel engine fuel oil tanks on trucks during the winter season. Here Solox is found especially useful, not only because of its ability to dissolve gums and sludge formations, but also because, being able to burn in the presence of water, Solox flashes off any moisture present, and in this way overcomes the blanketing effect of moisture. A still further advantage of Solox in this application is that it appears to have a catalytic effect which assists in securing cleaner and more complete combustion.

Widely Used in Lacquer Formulation

The composition of Solox has made it a very effective tool in the formulation of the newer lacquers. It consists essentially of 100 parts of S. D. Alcohol No. 1, to which are added 5 parts of ethyl acetate and 1 part of aviation gasoline. The addition of ethyl acetate increases the effectiveness of the solvent in a number of ways. In the first place, the ethyl acetate, besides being itself a very good organic solvent, actually increases the solvent power of the alcohol. These properties have been put to good use by many manufacturers of cellulose acetobutyrate lacquers, who have found a mixture of Solox and ethylene dichloride to be an excellent solvent.

In Special Adhesives

In the adhesive field, Solox has proved especially popular in the manufacture of quick-setting adhesives of the cellulose type. These adhesives have quickly won a place for themselves in many special applications, among which may be listed laminating cloth, paper, cellophane, and cellulose acetate.

Another wide use of Solox is in cleaning fluids. Combining a high solvent power with non-corrosive qualities, Solox has many advantages for use in cleaning watches, clocks, electrical equipment, and many other products.

Other Applications

The non-corrosive qualities of Solox are responsible for its use in other fields as well. In the prevention of ice formation on airplane propellers, a mixture of 15% glycerine and 85% Solox has been found highly effective. In duplicating machines, where corrosion is also a factor, Solox has been used to dissolve the aniline dye on the master copy.

Properties and applications of this unusual solvent are described in greater detail in a leaflet, "Solox, The General Solvent," which is available on request from U.S.I.

M. J. Rolstad Joins U.S.I.

NEW YORK, N. Y.—Announcement is made of the appointment of M. J. Rolstad to the sales staff of U. S. Industrial Chemicals, Inc., effective November 1. Mr. Rolstad will handle the sales of DEREX, U.S.I.'s new insecticide concentrate, to manufacturers throughout the country.

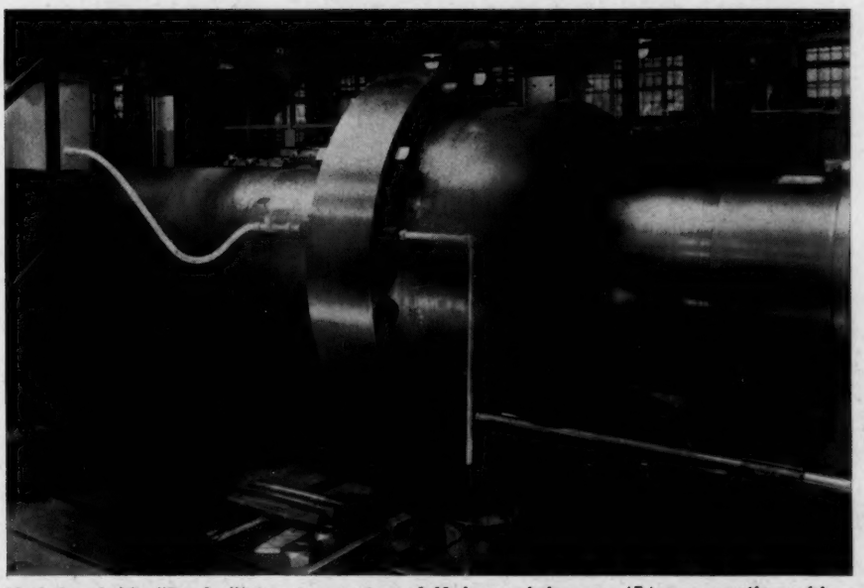
Mr. Rolstad's many years of broad experience in the insecticidal field particularly fit him for the introduction of this new and unique product. He will make his headquarters in U.S.I.'s general offices in New York.

A new one-coat finish for furniture gives the equivalent of two coats of lacquer, and does not require heating or baking, according to the manufacturer. It is said to be highly resistant to alcohol and water.

More Oiticica Oil Used

WASHINGTON, D. C.—On the market only a few years, oiticica oil is already considered one of the leading drying oils, and is finding increased use in the manufacture of paints and varnishes, it is reported by the Chemical Division of the Department of Commerce. Imports during the first half of this year exceeded the entire 1938 total.

Alcohol and "Dry-Ice" Shrink Tight-Fitting Bolts



Alcohol cooled by "Dry-Ice"* to a temperature of 40 degrees below zero (F.) was recently used by a large machinery manufacturer in this unusual assembly job on a coupling for connecting two shafts. 4-inch bolts were used for the assembly, and they were shrunk to fit by circulating the chilled alcohol through holes in the center of the bolts.

*Manufactured and supplied by Pure Carbonic, Incorporated, an associated Company of U.S.I.

ADVERTISEMENT—*This entire page is a paid advertisement.*

November ★ **SOLVENT NEWS** ★ 1939

One-Coat Finish Resembles Hammered Metal Surface

STAMFORD, Conn.—A finish that simulates the surface of hammered metal can be produced by a coating that can be applied to metal, wood, glass, or even fibrous materials, according to a patent issued to an inventor here.

According to the inventor, a typical finish is formulated as follows. A pigmented base material is prepared in the following percentages by weight:

Linseed oil	30
Glycerine	35
Phthalic anhydride	35

Color pigments may be added in varying amounts. An equal volume of thinner is then added to the base material. Thinner consists of 33% by volume of hydrogenated petroleum naphtha and 67% of ethyl alcohol denatured according to formula S. D. 1. An aluminum bronze powder is finally added to the mixture.

A decal for quick application to T-squares, etc., lists decimal equivalents of fractions, is available for free distribution. U.S.I. will be glad to refer readers to the distributor.

Perspiration-Resisting Lacquer Described

NEW YORK, N. Y.—A lacquer that is said to be perspiration-resisting is described in a patent issued to an inventor here. It is stated that the lacquer is composed of the following ingredients in approximately these proportions:

Nitrocellulose	52 parts
Alkyd resin	18 parts
Dibutyl phthalate	15 parts
Impalpable silica gel	15 parts

These ingredients are combined with suitable volatile solvents. The silica gel is added as a powder.

Dibutyl Phthalate is produced by U.S.I.

Finds Wash-Fast Sizing By Unusual Use of Acetone

HERISAU, Switzerland—An inventor here has found a new way to produce wash-fast sized fabrics that are resistant to shrinking, according to claims made in a recent patent.

Process is said to consist of incorporating in the textile partial condensation products from acetone together with aldehydes and then completing the condensation to the water-insoluble condition. Sizing materials of this type are colorless and odorless, says the inventor.

Gets Better Parasite Control with Butyl Acetate

OAKLAND, Cal. — Parasites can be killed with smaller amounts of spray oil if a small quantity of butyl acetate or amyl acetate is added to the spray, according to a patent issued to an inventor here. The acetate is said to give a selective wetting effect, enabling the spray to adhere more readily to the wax coating on the parasite than to the coating on the plant. The inventor also states that the use of the acetate produces a more lasting deposit of the oil in the spray.

Butyl Acetate and Amyl Acetate are U.S.I. Products

Reveal Best Film-Forming Bases for Airplane Dopes

WASHINGTON, D. C. — The third in a series of reports on an investigation of formulation of airplane dopes was recently issued by the National Bureau of Standards.

This report describes the results of exposure tests carried out on experimental dope formulas, with a view to determining the relation between composition, tautening and weathering qualities.

Cellulose acetopropionate and cellulose acetobutyrate are suggested in the report as promising film-forming bases to replace cellulose nitrate. These bases are said to give relatively non-inflammable dopes. It is also stated that the hydroxyl content of these mixed esters is very important in determining their suitability. The report recommends a hydroxyl content of about 0.2 equivalent for best results.

New Lacquer Seen as Aid To Smoother Concrete Surface

ROCHESTER, N. Y. — Unusually smooth concrete can be cast with the aid of a new lacquer applied to plywood casting forms, it was announced here. When applied to the form with an ordinary calcimine brush, the lacquer produces a hard, water-resistant surface that does not raise the grain of the wood, the announcement continues. When the form is removed, only the faintest impression appears on the concrete, it is said.

Major ingredient of the lacquer is reported to be the same type nitrocellulose as used in photographic films.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

An aluminum paint is now available at a cost that is said to be much lower than previous types. It comes in paste form, and is used according to the maker, by adding plain water. The resulting finish is said to be water- and oil-proof. **(No. 270)**

U S I

Methyl oleate and methyl stearate are said to be now in commercial production. The maker expects the products to have many applications, among which he lists plasticizers, cleaning and polishing compounds, varnish removers, stamping inks, and softeners for leather and rubber. **(No. 271)**

U S I

A wood-treating solution combines volatile and non-volatile toxicants, it is reported. The volatile toxicant provides a high degree of toxicity for the first two years, while the non-volatile ones give long term protection, according to announcement by the manufacturer. **(No. 272)**

U S I

A new treatment for paints is said to result in greater adhesion, elasticity, toughness, and chemical stability. It is claimed that it can be used with all conventional types of paints and enamels, and that it prevents cracking, chipping, and peeling. It should not be used with lacquers and varnishes. **(No. 273)**

U S I

Paint spraying equipment is now provided with forced draft cooling, which is said to increase operating efficiency. In addition, the new units have higher air delivery, greater painting capacity, and greater ease of delivery, according to the manufacturer. **(No. 274)**

U S I

Rust preventive coatings are available in non-drying ("slushing"), hard-drying transparent, and hard-drying aluminum types, according to the manufacturer's announcement. They are said to have a wide range of application. **(No. 275)**

U S I

A floor cleaner is said to be non-alkaline and free from soaps, fats, oils, and solvents. It is further claimed that the product is harmless to the skin and to the surface being cleaned. **(No. 276)**

U S I

A rubber lubricant is non-corrosive to metals and their coatings, the manufacturer states. It is said to consist of colloidal graphite blended with an oil and wetted by glycerol compounds, which also act as stabilizers. **(No. 277)**

U S I

A cleaning unit is said to apply kerosene or other cleaning fluids by the aid of compressed air. According to the manufacturer, it is suitable for cleaning motors, engines, and mechanical parts. **(No. 278)**

U S I

Wax emulsions can be prepared by a new process which will eliminate costly and bulky equipment, it is claimed. It is said that the process employs an atomization principle. **(No. 279)**

U.S.I. INDUSTRIAL CHEMICALS, INC.

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Butyl Alcohol
Fusel Oil—Refined
Methanol

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Anhydrous
Absolute
C. P. 96%
Pure (190 proof)
Specially Denatured
Completely Denatured
U. S. I. (Denatured Alcohol Anti-freeze)
*Super Pyro Anti-freeze
*Solox Proprietary Solvent

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Ansol M
Ansol PR

ESTERS, ACETATES
Acetic Ether
Amyl Acetate
Butyl Acetate
Ethyl Acetate

ESTERS, ETHYL
*Diatol
Diethyl Carbonate
Diethyl Oxalate
Ethyl Chlorocarbonate
Ethyl Formate
Ethyl Lactate

*Registered Trade Mark

ESTERS, PHTHALATES
Diamyl Phthalate
Dibutyl Phthalate
Diethyl Phthalate
Dimethyl Phthalate

OTHER ESTERS
Amyl Propionate
Butyl Propionate
Dibutyl Oxalate

INTERMEDIATES
Acetoacetanilid
Acetoacet-o-chloranilid
Acetoacet-o-toluidid
Ethyl Acetoacetate
Sodium Ethyl Oxalacetate

ETHERS
Ethyl Ether
Ethyl Ether Absolute—A.C.S.

OTHER PRODUCTS
Acetone, C.P.
Butyl-mesityl-oxide-oxalate
Cellulose Acetate
Collodions
*Curbay Binders
*Curbay X (Dried Curbay)
*Derex
Ethylene
Methyl Acetone
Nitrocellulose Solutions
Potash, Agricultural
*Vacatone

Solvents

Consumers Continue Heavy Shipment Demands

Spot Quotations on Acetone, Butyl Alcohol, Butyl Acetate, Ethyl Acetate Advanced—All Alcohol Prices Increased 2c—Petroleum Solvents Higher in N. Y. and New England Markets

THE wave of hysterical buying continued in the solvents during the past 30 days. At the close of the month there appeared to be a little less excitement, but producers of coatings and other large consumers of solvents continued to take large shipments. Prices of many important solvents have been advanced and even further increases are expected.

Spot prices of acetone were "upped" once more last month. Tanks are now on a 6c delivered basis, with carlots in drums 1c higher, and l.c.l. quantities 1½c above the tankcar price.

Spot quotations on butyl alcohol are also higher. Tanks, freight allowed, are 8c; tank-wagons, 8½c; carlots in drums, 9c; and l.c.l. shipments are 9½c. Spot quotations for amyl acetate, ex fusel oil, were uniformly 1c higher early in October, making tanks 11½c delivered, carlots in drums 12½c, and l.c.l. shipments 1c differential over the tankcar prices.

The market for the normal grade of butyl acetate was another important product to advance. Tanks are now 8c, carlots 1c higher, and l.c.l. lots 1½c above the tank quotation. No change was noted in quotations for secondary.

Ethyl acetate quotations were also uniformly 1c higher in the general upward sweep of solvents prices. The latest quotations follow: 85-90% tanks, freight allowed, 6.1c per lb.; carlots, drums, 7.1c and less carlots, drums 7.6c; 95-98%, tanks, freight allowed, 6.85c; carlots, drums, 7.85c, and l.c.l. drums, 8.35c.

In all these price changes cited above the changes refer only to spot or new business. Contract prices for the 4th quarter were announced several weeks ago.

Alcohol prices continue to work into firmer ground. This situation is in strange contrast with the conditions prevailing just 12 months ago in this item. Early in October alcohol factors announced a general 2c per gal. increase. The market for pure ethyl has been established at $4.48 per gal. in tankcar lots; drums, carlots, $4.54; 19 drums, $4.57½; 1 to 18 drums, $4.60½. Absolute ethyl alcohol in drums, carlots, was set at $4.81½; 19 drums, $4.85; 1 to 18 drums, $4.88. All denatured formulas were 2c higher. Tankcar quotations are now:— C. D. 14, 25½c per gal.; S. D. 1, 21½c; S. D. 2B, 20½c; S. D. 23G, 26c. special solvent, 22½c.

Firmer prices were in evidence in several sections of the country on petroleum solvents. Demand was exceptionally heavy and this situation was expected to carry through the balance of the year. One large producer announced a general price rise of ½c per gal. in New York and New England territories on all important types of petroleum solvents and other factors were expected to follow shortly.

Important Price Changes

ADVANCED

	Oct. 31	Sept. 30
Acetone, spot, tks.	$0.06	$0.05
drs.	.07	.06
Alcohol, butyl, tks.	.08	.07
drs.	.09	.08
Alcohol, ethyl, tks.	4.48	4.46
drs.	4.54	4.52
C. D. 14, tks.	.25½	.23½
S. D. 1, tks.	.21½	.19½
S. D. 2B, tks.	.20½	.18½
S. D. 23G, tks.	.26	.24
Spec. Solv.	.22½	.20½
Amyl acetate, tks.	.11½	.10½
drs.	.12¼	.11½
Butyl acetate, tks.	.08	.07
drs.	.09	.08
Ethyl acetate, 85-90%, tks.	.061	.051
drs.	.071	.061
Isopropyl acetate, spot, tks.	.06	.051
drs.	.07	.061

DECLINED

None

Personals

E. K. Halbach, president, General Dyestuffs Corp., N. Y. City, has accepted the chairmanship of a Dyestuffs Group to aid the 23rd annual membership roll call of the American Red Cross, N. Y. Chapter.

William A. Hart, Du Pont, is chairman of the jury which will select the winners of the 1939 annual advertising awards.

O'Connor in South America

C. J. O'Connor, executive vice-president of Reichhold Chemicals, Inc., Detroit, is en route to Rio de Janeiro, Buenos Aires and other South American cities, to conduct an economic survey among South American paint, varnish, lacquer, and enamel manufacturers. Reichhold will select a strategic location for the erection of a South American plant, on the basis of Mr. O'Connor's recommendations.

Coal-Tar Chemicals

Refined Naphthalene Prices Raised

Stocks of Crude Reported Scarce—No Let-Up in Volume of Shipments of Coal-Tar Solvents—Phenol Firm—Domestic Cresylic Prices Increased—September Coke Output Up—

NO signs of any let-down in the demand for coal-tar chemicals were in evidence during the past 30 days. Many products were in short supply and delays in prompt shipments were reported in some instances.

Pricewise there were very few changes to report. A new schedule was released for various grades of refined naphthalene, effective Oct. 10, showing advances of ¾c to 1c per lb. New schedule follows: Balls or flake, barrels, wholesalers and jobbers, 6¾c; 50 lb. cases, 7c per lb.; packages, 16 oz., 7½c per lb.. packages 12 oz., 6c per lb. Chipped, crushed, barrels, 6c per lb.; rice, crystal and powdered, barrels, 6¾c per lb. Above prices are f.o.b. works, freight equalized with other producing points. Contracts are subject to revision on first day of each calendar month and will be accepted for the period ending Sept. 30, 1940.

No price changes were reported for either domestic or imported crude naphthalene. Momentarily there is very little interest in the crude material. However, there is a very definite shortage of crude and this is the principal reason for the advance in refined at this time.

The sizable increases in the last 60 days in coking operations has made larger stocks of benzol, toluol, xylol, and solvent naphtha possible. Still there is very little spot material available and exporters are finding it extremely difficult to obtain stocks for immediate shipment. The market for phenol remains very active and some suppliers have had, it is reported, to turn down export inquiries in order to take care of regular customers.

Important Price Changes

ADVANCED

	Oct. 31	Sept. 30
Acid cresylic, H. B.	$0.58	$0.49
L. B.	.58	.49
Naphthalene, re'fd. balls, flakes, bbls.	.06¾	.05¾

DECLINED

None

Early in the past month domestic producers of cresylic readjusted quotations higher, the gain for both high boiling and low boiling grades being 9c per gal. Material is extremely scarce with very little imported material available. Firm prices continued for creosote oil, crudes, tar acid oils and coal-tar acids.

Benzol output in September, 9,435,000 gals., was approximately 8% above August volume of 8,797,000 gals., and well over 50% better than the September, '38, figure, 6,056,000 gals.

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YEARS of experience, continuous research, large capacity and ability to meet special and exacting requirements, gives us leadership in the World production of Citric Acid.

The physical uniformity and the high purity of our product are unexcelled by any other maker.

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Fine Chemicals

Mercury Quotations Ease Slightly

Heavy Demand for Most Items Continues—Manufacturers Discourage Speculative Buying—Iodine Advanced—Bismuth Metal and Important Salts Quoted at Higher Levels—

THE demand for fine chemicals, pharmaceuticals, essential oils and aromatics showed no sign last month of diminishing. In fact buyers continued to make every effort to acquire additional stocks of certain items which they felt probably would work into higher price ground.

Producers have made every effort to keep their regular customers supplied with raw materials. There have been attempts to acquire stocks for speculative purposes, but with very little success. Manufacturers have managed to keep prices from rising to absurd heights brought about by purely speculative activity. Conditions for both maker and legitimate buyer are much better because of this.

Quotations on quicksilver turned downward last month when considerable slackening of the demand became evident and additional stocks of Spanish metal came on the market. Buyers seem to have acquired sizable stocks sufficient for current needs and the present market is a rather dull one in comparison to the high degree of excitement in September and the first part of October.

Crude iodine prices advanced strongly in the past month. As a result, resublimed iodide, iodoform, potassium iodide, sodium iodide and many of the so-called minor iodides, such as ammonia, arsenic, barium, calcium, copper, iron, manganese, and strontium moved into higher ground.

Excellent demand in the face of light stocks was responsible for quotations being raised sharply on adeps lanae. At the month-end hydrous material was priced at 29c and anhydrous 1c higher. With the first wave of buying hysteria over, some slackening in natural camphor was reported, and a somewhat similar situation was reported in menthol.

Bismuth metal was "upped" 15c in the middle of the past month and varying increases in the subcarbonate, subgallate, subiodide, and the subnitrate were announced. A highly stable market prevails in citric acid, due to the action of one of the largest factors in announcing that the present price will be guaranteed against rise up to Oct. 1, '40.

Important Price Changes

	Oct. 31	Sept. 30
ADVANCED		
Adeps Lanae, hyd.	$0.29	$0.25
anhyd.	.30	.26
Alcohol, ethyl, pure	4.48	4.46
Ammonium iodide	3.65	3.45
Barbital	3.25	3.00
Bismuth, metal	1.25	1.10
subcarbonate	1.73	1.53
subgallate	1.68	1.58
subiodide	3.98	3.88
subnitrate	1.48	1.33
Chloral hydrate	.90	.80
Iodine, resublimed	2.00	1.75
Iodoform	4.10	3.95
Potassium iodide	1.25	1.13
Sodium iodide	2.30	2.21
DECLINED		
Camphor, nat.	$0.65	$0.70
Quicksilver	140.00	150.00

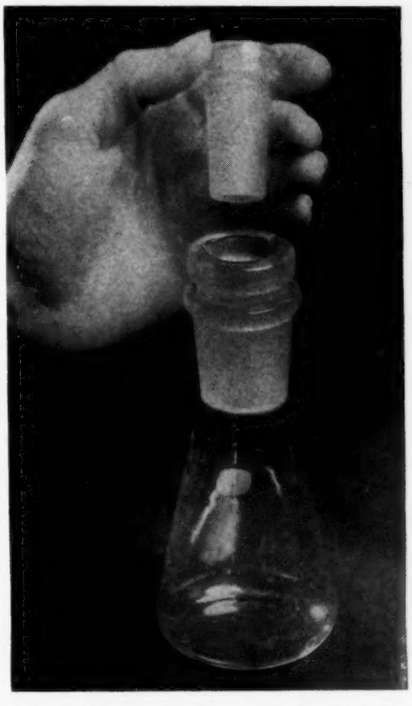
Carbide's New Book

An attractively illustrated book on "Fine Chemicals"—the term for 63 organic chemicals recently added to those already industrially available—has been published by Carbide and Carbon Chemicals Corp., N. Y. City. For the first time, the chemical industry is offered a well-balanced array of commercial synthetic organic chemicals—including now a wide choice of chemicals in each major organic family. In addition, a glimpse of the future is given by listing many "research" products, samples of which can be supplied on request.

Story of Photography

A short treatise on photography is given in the November number of *Priorities*, house-organ of Prior Chemical Corp., N. Y. City. The subject is opportune, since the present year is being celebrated as the centennial of photography. The article tells what happened one hundred years ago to occasion the observance of the centennial and glances at some of the phases of photography which give it a secure place in the life of people of today.

Stress is laid on the essentially chemical nature of the photographic process; interesting observations are made on the part photography plays in industrial and scientific research, and some indication is given of the extent of the industry and wide employment now dependent wholly or in part on the photographic process.



Corning Glass will show at its booth at the Chemical Show this new Pyrex adapter. Meets a definite demand for a bushing type adapter that is decidedly more compact.

Heyden Reacquires Stock

Heyden Chemical Corp., N. Y. City, has reacquired 24,500 shares of common stock from Chemische Fabrik von Heyden, A. G., Germany, thereby eliminating all foreign interests in its stock. Purchase was made at $35.50 per share, a total of $869,750.

Givaudan Plant Expansion

Givaudan-Delawanna, Inc., N. Y. City, is erecting 2 new buildings at its plant in Delawanna, N. J., at a total cost of about $25.000. Additional space will be provided for company's increasing production of aromatic chemicals.

Nominating Committee Reports

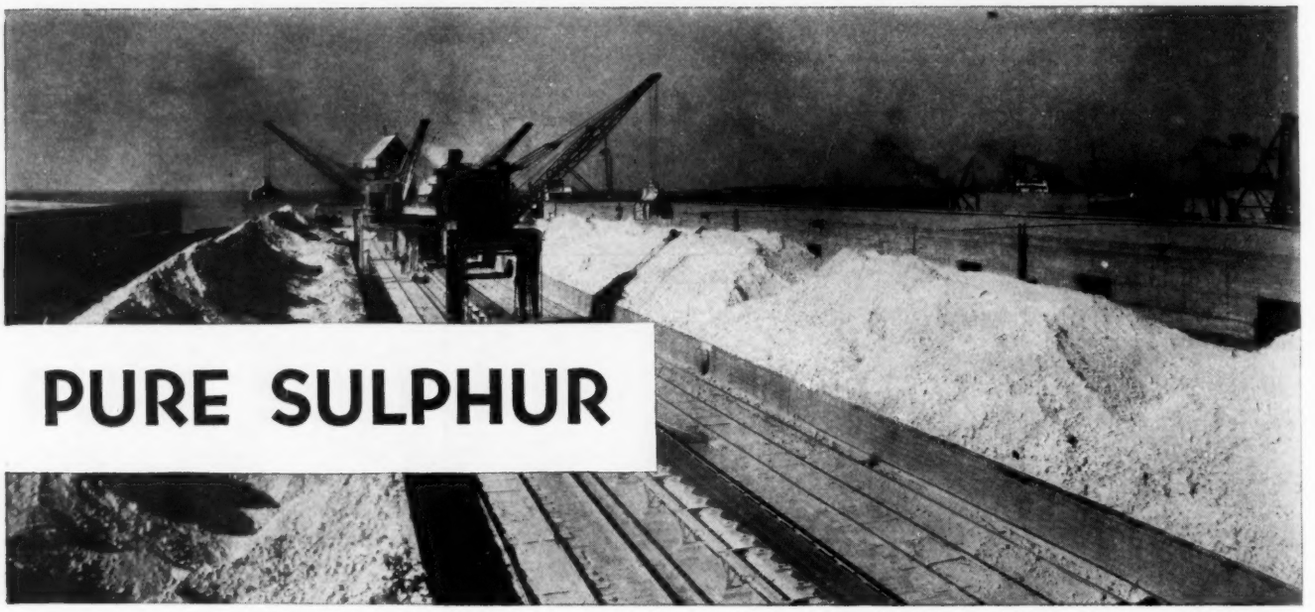
DeWitt Thompson, assistant sales manager, Mathieson Alkali, N. Y. City, was nominated last month for the presidency of the Salesmen's Association of the American Chemical Industry. Other nominees are: Walter Merrill, Joseph Turner & Co., N. Y. City, vice-president; C. O. Lind, Dow Chemical, treasurer; and Gerald Furman, Merck & Co., secretary.

Ames Now a V.-P.

John T. Ames has been elected vice-president of American-British Chem. Supplies, Inc., N. Y. City, and Chas. Tennant & Co., Ltd., of Canada. He succeeds to the vacancy left by the death of Edward H. Watson. Mr. Ames is vice-president of Kay-Fries Chemicals, Inc., an associated company, and had been Mr. Watson's assistant for the past 5 years.

Junior Engineers To Meet

The Junior Chemical Engineers will hold an open banquet meeting at 6:30 P. M. on Tuesday, Dec. 5, at the Rogers Smith Restaurant, 40 E. 41st st., N. Y. City. Annual banquet is being held at this time in order that it may serve as a get together for students and young chemical engineers who are in the city for the Chemical Exposition. S. D. Kirkpatrick, editor of *Chemical and Metallurgical Engineering*, will speak on the subject "New Opportunities for the Chemical Engineer."



PURE SULPHUR

Sulphur Service

New and Interesting Facts about This Versatile Element

How many realize that Sulphur has excellent insulating properties? Note, for example, its relative position in the following table of thermal conductivities (B.t.u./hr./sq.ft./°F./in.):

Corkboard	0.32
Sawdust	1.04
Sulphur impregnated poplar	1.00
Sulphur	1.72—2.00
Asbestos Wood	2.70
Red brick	4.35
Concrete, stone	8.30

Sulphur has been used as the insulating material in common household containers for keeping foods hot or cold. Its imperviousness to moisture is advantageous, too, when used in this manner.

Sulphur has many other interesting properties that suggest other new and novel uses.

TEXAS GULF SULPHUR CO.
75 E. 45th Street New York City
Mines: Newgulf and Long Point, Texas

Agricultural Chemicals

Mixers Show Little Interest in Raw Materials

Appear Well Stocked for Next Mixing Season—Natural Ammoniates Lower—Sulfate of Ammonia Stocks Improve—New French Potash Company Announced—Tag Sales Off—

MIXERS at this point seem to be fairly well stocked with raw fertilizer materials. At the moment, as they start preliminary mixing operations in the extreme South and still remain practically at a standstill in the more northerly parts, they are showing very little interest in further purchasing. The natural ammoniates slipped from the higher levels reached late in September in the face of a very little real interest on the part of consumers.

Some of the uncertainties surrounding the potash situation were cleared up slightly when a new company was formed last month to import French potash. Stocks of sulfate of ammonia are in somewhat better state due to the heavy increase in coking operations. Producers offered material at $27.50 for delivery during November. Urea-nitrogen prices for November have been advanced and the new quotations are indicated in the box.

Important Price Changes

	Oct. 31	Sept. 30
ADVANCED		
Ammonium sulfate	$27.50	$27.25
Urea-nitrogen, 42%	56.40	55.40
40%	55.25	53.50
30%	41.85	40.35
DECLINED		
Blood, dried, N. Y.	$3.70	$4.25
Chgo.	3.60	4.25
imp.	3.35	3.90
Nitrogenous mat., East	3.00	3.10
imp.	2.85	3.00
Potassium sulfate (fert.)	36.25	40.00
Tankage, ungrd.	3.75	4.50

September Tag Sales Down

Fertilizer tag sales in September amounted to 215,877 tons, according to the N. F. A., representing a 5% decline from September of each of the past 2 years. August tag sales totaled only 154,865 tons, while July sales were only 51,633. For the first 9 months of the year, the gain over last year was about 3%—4,901,754 tons, against 4,766,154. In this 9-month period, the total of tag sales was calculated to be about 63.5% of the nation's total consumption of fertilizers (assuming this percentage to be approximately the same as last year's); on this basis, the fertilizer consumption in the U. S. would be about 7,720,000 tons in all, as compared with about 7,504,000 in the like '38 period.

"Super" Production Up

Superphosphate production in recent years has averaged about the same in September as in August. This year, however, output was substantially larger in September than in August, according to the N. F. A. It was also well above last year, but smaller than 2 years ago. Total superphosphate production (bulk plus base and mixed goods) in September was 273,378 tons, 14% greater than in September of '38, when the output was 238,943 tons. January-September production has been somewhat above last year, with a very small decline reported for the Northern Area and a moderate rise for the Southern. Output has been the largest reported in several years—1937 excepted.

Ammonia sulfate output for September, 52,834 tons, was about 45% over that for the like '38 month, although only about 4% better than August's 50,565 tons.

Forms Potash Company

Walter B. Howe, former general sales manager of N. V. Potash Export My., N. Y. City, heads the newly-formed French Potash Co., Rockefeller Center. He has been connected with the fertilizer industry for nearly 30 years and, from 1921 to 1927, was with the French Potash Society, when he joined the N. V. Potash organization. Paul L. Masson is secretary of the French Potash Co., which is to import from Alsatian deposits.

To Mine Phosphate Rock

John H. Kresge, a cousin to the founder of the Kresge stores, is president of the newly-formed Harpeth Valley Chem. Co., Nashville, Tenn. Company will handle Tennessee phosphate rock from Williamson County, with field headquarters at Franklin, Tenn. It is reported that the new concern will erect and operate several small plants for processing phosphates in the vicinity of Franklin.

New Company Formed

Master Fertilizer Co., Inc., with an authorized capital stock of $50,000, has been formed in Fairmont, N. C., to deal in commercial fertilizer materials.

Chandler Succeeds Logan

Vice-President Garner appointed Senator Chandler, Kentucky, to the Joint Committee to Investigate the Adequacy and Use of Phosphate Resources; the Senator's appointment fills the vacancy created by the death of Senator Logan, Kentucky.

Devilbiss Promoted

J. C. Devilbiss has been appointed to succeed the late Andrew A. Holmes as vice-president of U. S. Potash Co., N. Y. City. He has been in the fertilizer trade for nearly 35 years, and was with the Virginia-Carolina Chem. Corp. until 1932, when he came with U. S. Potash as manager of sales. Mr. Devilbiss will continue to direct company's sales division.

Barbecue—T. G. S. Style

Texas Gulf Sulphur was host to 600 employees at a barbecue last month, held in Newgulf, Tex.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912 AND MARCH 3, 1933

Of *Chemical Industries*, published monthly except twice in October, at New Haven, Conn.

State of New York, County of New York, ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared George C. Williams, who, having been duly sworn according to law, deposes and says that he is the Vice President of the Tradepress Publishing Co., Inc., publishers of *Chemical Industries*, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse side of this form, to wit:

1. That the names and addresses of the publisher, editor, and business manager are: Publisher, editor, managing editor, and business managers are: Publisher, Tradepress Publishing Co., Inc., 205 West Wacker Drive, Chicago, Ill.; Editor, Williams Haynes, 522 Fifth Avenue, New York, N. Y.; Managing Editor, Walter J. Murphy, 522 Fifth Avenue, New York, N. Y.; Business Manager, William F. George, 522 Fifth Avenue, New York, N. Y.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent. or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Tradepress Publishing Co., Inc., 205 West Wacker Drive, Chicago, Ill.; Horace T. Hunter, 522 Fifth Avenue, New York, N. Y.; J. L. Frazier, 2043 Orrington Avenue, Evanston, Ill.; George C. Williams, 205 West Wacker Drive, Chicago, Ill.; Williams Haynes, 11 Franklin Terrace, South Orange, N. J.; William F. George, 216-18 Corbett Road, Bayside, L. I., N. Y.; Tradepress Publishing Corp., 205 West Wacker Drive, Chicago, Ill.

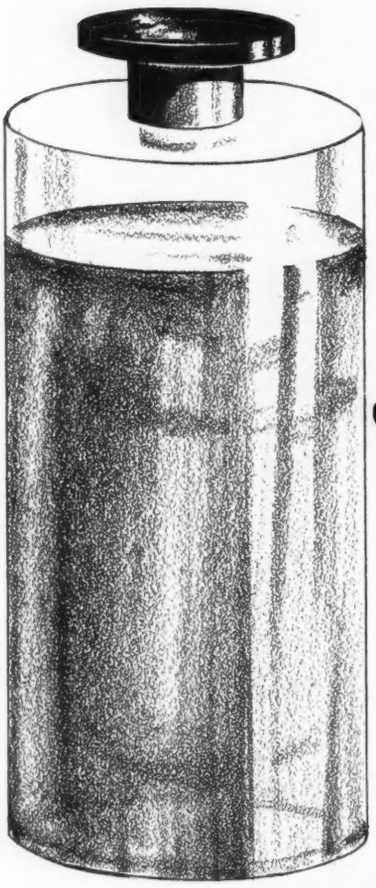
3. That the known bondholders, mortgagees, and other security holders owning or holding one per cent. or more of total number of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to said subscribers during the six months preceding the date shown above is ——. (This information is required from daily publications only.)

GEORGE C. WILLIAMS,
Vice President.

Sworn to and subscribed before me this 29th day of September, 1939. Philip Baumeister, Notary Public, County of Westchester. (Comm. expires March 30, 1941.) Filed in County of New York.



BEFORE

AND

AFTER

TREATMENT WITH

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Raw Materials

Chinawood Oil Stocks at New Low Point

Other Drying Oils Decline—Waxes Reach Higher Levels—Carnauba Stocks Scarce—Corn Derivatives Lower—Shellac Firm and in Good Demand—Rosin Steady—Turps Lower—

THE markets for the principal oils and fats showed definite signs of returning more nearly to normalcy in the last two weeks of October. The feverish attempts to acquire large inventories appeared to be largely over. Buyers generally now are fairly well stocked and have not the same desire to take on additional tonnages unless some price concession is made. A general study of the more important industrial oils and fats indicate that practically all lost some price ground in the last 30 days. Castor oil was one outstanding exception to this statement, and the tight situation in Chinawood stocks in this country prevented any decline in that item. In fact, a few tanks were said to have changed hands at 24c, a slight gain over the prevailing market price late in September.

Other drying oils, notably linseed and perilla, moved into lower quotations when demand showed signs of declining. All of the refined fish oils were quoted lower at the month-end.

The weakness in the grain markets and particularly corn was reflected in price revisions in the principal corn derivatives, including starch, dextrin, tanners' corn sugar, and corn syrup.

The important waxes provided much of the interesting market news in the natural raw materials group. Stocks of Bayberry were below normal and consumers eagerly bid these in at around 38c-39c. Quotations on bees were slightly higher at the month-end, but the heavy price advances were scored by several grades of Carnauba, particularly yellow. There is virtually a shortage and sales are said to have been closed at 78c-80c—pretty close to a 100% increase since the start of the new European War.

Supplies of many of the natural dyes and tanstuffs are small indeed. Factors are limiting shipments in many instances to customers' immediate needs. Tanners are operating at very high capacities and many are finding it difficult to get supplies through on time.

Turpentine Off Slightly

Naval stores exhibited at times firm tendencies during the period under review. Turpentine, however, pricewise changed little and at the month-end was quoted at Savannah at 27c as compared with 27½c at the end of September.

Conditions in shellac were slightly toned down from the extreme excitement following the outbreak of the war abroad. However, stocks in this country are none too plentiful and quotations are still largely nominal in nature.

Not much real improvement can be reported in the shipping situation as yet. Space is very difficult to get, is subject to all kinds of delays, rates are very high, and war risk insurance rates have but only in a very few instances declined to any appreciable degree. Importers are urging their customers to anticipate their future requirements to such an extent that at least twice the normal time of transit can be arranged. Even that is hardly enough under present conditions.

Important Price Changes

	Oct. 31	Sept. 30
ADVANCED		
Bayberry wax	$0.38	$0.33
Beeswax, white	.38	.37½
Candelilla, wax	.18	.16½
Carnauba, No. 3, chalky	.43	.36
Castor oil, blown	.12¾	.11¼
Chinawood oil, tks.	.24	.23
DECLINED		
Babassu oil, tks.	$0.06⅞	$0.07⅝
Coconut oil, crude, tks.	.037⁄8	.045⁄8
Corn oil, crude, tks.	.06½	.07⅛
Corn Sugar, Tanners'	2.94	3.14
Syrup, 42°	2.97	3.17
43°	3.02	3.22
Dextrin, British Gum	3.60	3.80
Corn, Canary	3.55	3.75
White	3.30	3.50
Lard oil, No. 1	.09½	.10
Linseed, raw, tks.	.093	.102
Menhaden, crude, tks.	.33½	.35
ref'd alk., tks.	.074	.076
Peanut oil, crude, tks.	.07	.07¼
Perilla oil, tks.	.13¼	.13½
Sardine oil, crude, tks.	.33	.38
ref'd alkali	.074	.076
Starch, pearl	2.45	2.65
powd.	2.55	2.75
Soybean oil, crude, tks.	.06	.06½

Obituaries

George H. Jackle, 67, died suddenly Oct. 21 in his N. Y. City home. He was widely known in the fertilizer and related fields, having been in the wholesale fertilizer business all his life. Since 1921, he had been head of his own firm, George H. Jackle, in N. Y. City.

Mr. Jackle leaves his widow, Mary Tuill Jackle; a son, Frank; his mother, Mrs. Sarah Jackle; a brother, Frederick, and a sister, Mrs. Frederick Seidel.

Charles W. Priddy

Charles W. Priddy, 75, a former member of the board of directors of American Agricultural Chem. Co., and prominent in the fertilizer industry for more than 50 years, died Oct. 25 in Norfolk, Va. He entered the fertilizer businesss in 1883, being employed by Travers, Snead & Co., Richmond, Va. In 1893 he moved to Baltimore, accepting a position with Woolridge Fertilizer Co. Three years later, he organized the Pocomoke Guano Co., in Norfolk, which later merged with American Agricultural Chem. Co., and Mr. Priddy remained with the latter firm until 1919. In 1901, he organized and became president of Chas. W. Priddy & Co., manufacturers of agricultural lime and land plaster. He was an active and well-known member of the N. F. A.

Reginald F. Richard

Reginald F. Richard, 55, general manager of Monsanto's Phosphate Division, died on Oct. 25 in St. Louis, after an illness of several months. During his

business career, he was associated with General Chemical Co. from 1905 to 1933 in various positions connected with plant operations, being general manager at the time of his leaving to join Swann Chemical Co., acquired by Monsanto 2 years later.

Mr. Richard was a member of the Engineers Club of N. Y., Chemists' Club (N. Y.), and of the University Club, St. Louis. He is survived by his wife, Mrs. Mabel Richard, his mother, and four children, Walter, Robert, Alice and Mrs. William King, Jr.

Other Deaths of the Month

Edward S. Davis, 66, secretary and general manager of the Detroit Chemical Works, on Oct. 21 in Detroit.

Mrs. Rena E. Smith, 49, wife of Cephas C. Smith, vice-president of Potash Co. of America, died unexpectedly on Oct. 8 in her home at Guilford, Md. Besides her husband, she left two children, Cephas C., Jr., and Peter Carlton Smith.

Dr. Joseph B. Lindsey, 77, professor emeritus of chemistry at Mass. State College, died on Oct. 27 in his home at Amherst, Mass.

ADVERTISING PAGES REMOVED

Pigments and Fillers

October Tonnages Exceptionally Heavy

Slight Lessening in Demand Reported Late in Month—Casein Prices Fail To Go Higher—Heavy Shipments of Carbon Black—Red, Yellow Cadmium Lithopones Higher—

A SLIGHT decline in the demand for raw paint materials was somewhat noticeable in the final few days of October. Tonnages for the month, however, were exceptionally heavy and represented not only strenuous efforts on the part of buyers to accumulate inventories, but also a fine outdoor fall painting season which saw paint manufacturers forced to step up production schedules at the last minute.

The steady advance in domestic casein seemed halted, at least temporarily, when much larger stocks of Argentine material became available in the local markets. Very steady interest throughout the 30 day period was reported in the titanium pigments and the zinc oxides. Buying in lead pigments appeared to be somewhat less active in the last half of the month. There seemed to be a feeling among buyers that most if not all of the immediate increase in lead pigments had already been made and that a more stable market might be expected up to the close of the year.

Important Price Changes

ADVANCED

	Oct. 31	Sept. 30
Cadmium lithopone, red, light shade	$0.75	$0.70
yellow	.50	.45
Charcoal, softwood, c. l.	32.40	30.00

DECLINED

None

Natural Varnish Gums Off

For the first time in many weeks a slightly easier tone was in evidence for the natural varnish gums. In the third week of the month some 12 types were reduced in price. The feverish buying period seems to be definitely over and some resemblance of orderly markets appears likely. Importers are now more encouraged as to the possibility of getting replacement stocks through.

October sales and shipments of carbon black were equal to or even possibly heavier than in September. At the month-end technical red mercury oxide was quoted at $2.41 and $2.26 for the yellow; vermilion at $2.70. There was some feeling in the trade, however, that quicksilver would show some further recession in price after reaching the dizzy heights of $160-$170 per flask and that the mercury pigments might ease slightly.

There is little in the way of any change to report in synthetic resins. Prices continue to hold steady and unchanged. Producers of ester gum are quoting 6¼c-6¾c in the N. Y. Metropolitan area. The tight situation in imported whiting seems to have improved somewhat since a large cargo of Belgian whiting reached this country on Oct. 20.

Early in October a 5c increase in all shades of red cadmium lithopone was placed in effect and a similar increase was announced for the primrose, lemon, golden and orange shades of cadmium yellow.

September paint, varnish and lacquer sales expanded to a volume of $38,468,830, a substantial advance over the previous month's $34,448,530, and all of 24 per cent. better than in the like '38 period—$31,046,584. Third quarter sales were valued at $301,487,879, about 12 per cent. better than in the same 9 months of last year, $270,140,396.

Trade sales in September amounted to $21,485,810 (580 establishments), more than 25 per cent. greater than last September's. Industrial sales were also up sharply, amounting to $13,398,357, as compared with $10,492,087 in September of '38.

September construction contracts were valued at $323,227,000, as compared with $312,328,000 in the preceding month, and with $300,900,000 in September of '38, according to F. W. Dodge Corp. Increased private construction more than offset a moderate decline in publicly-owned projects, the increase in private building being largely due to a larger volume of commercial and factory building. The cumulative contract total for the first 9 months of the year, $2,634,802,000, is the highest for any like period since 1930 and 23% greater than the total for the corresponding '38 period ($2,028,798,000).

Reichhold With 7 Plants

Two Reichhold production engineers are now en route to Australia to supervise the installation of machinery and equipment in a newly-erected synthetic resin plant at Rosebery, a suburb of Sydney. It is expected that the Rosebery plant will be in production about Jan. 1, to produce and distribute the RCI line of synthetic resins to coatings manufacturers throughout Australia and New Zealand. The completion of this plant will increase the number of Reichhold factories to 7—2 in the U. S., 4 in Europe, and 1 in Australia.

S. & W.'s Plant Expansion

Stroock & Wittenberg Corp., N. Y. City, has already announced the erection of a new alkyd plant in Newark, N. J., with railroad and deep water accommodations. Simultaneously, the firm is building another modern synthetic resin manufacturing unit in Pensacola, Fla. The Southern site is also strategically located, having its own railroad siding, and being only a short distance from the docks and close to many of its important raw materials. Laboratory facilities are being considerably enlarged.

Members of the N. Y. Chapter of the American Institute of Chemists tender testimonial dinner to Dr. Robert J. Moore, Bakelite, president of the A. I. C. At the speakers' table: Foster D. Snell; Prof. W. T. Read; Dr. Maximilian Toch; Dr. Harry G. Lindwall, chapter head; Dr. Moore; Prof. Marston T. Bogart; "Bob" Calvert; and Howard Nieman. Place—The Chemists' Club, N. Y. City. The time—Nov. 3.

Prices Current

Heavy Chemicals, Coal-tar Products, Dye-and-Tanstuffs, Colors and Pigments, Fillers and Sizes, Fertilizer and Insecticide Materials, Petroleum Solvents and Chemicals, Naval Stores, Fats and Oils, etc.

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f. o. b. works are specified as such. Import chemicals are so designated. Resale stocks when a market factor are quoted in addition to maker's prices and indicated "second hands."

Oils are quoted spot New York, ex-dock. Quotations f. o. b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f. o. b., or ex-dock. Materials sold f. o. b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both. Containers named are the original packages most commonly used.

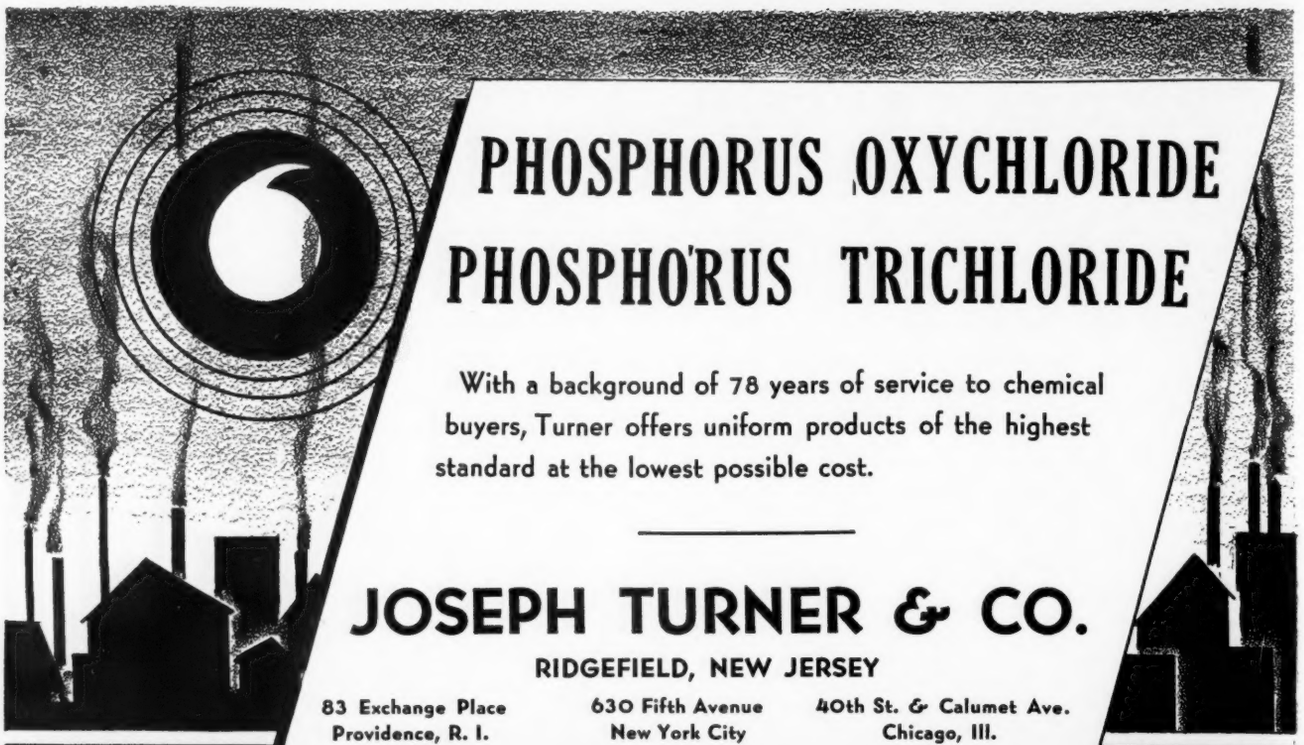
Purchasing Power of the Dollar: 1926 Average—$1.00 - 1937 Average $1.10 - Jan. 1939 $1.25 - October 1939 $1.20

	Current Market	1939 Low	1939 High	1938 Low	1938 High
Acetaldehyde, drs. c-l, wks lb	...	.10	.10	.14	...	.14
Acetaldol, 95%, 50 gal drs wks lb.	.21	.25	.21	.25	.21	.25
Acetamide, tech, lcl, kgs lb.	.28	.50	.28	.50	.32	.60
Acetanilid, tech, 150 lb bbls lb.	...	.22	.22	.29	.29	.32
Acetic Anhydride, drs, f.o.b. wks, frt all'd ... lb.	.10½	.11	.10½	.11	.10½	.11
Acetin, tech, drs. ... lb.	...	.33	..	.33	...	.33
Acetone, tks, f.o.b. wks, frt all'd lb.	...	.06	.04¼	.06	...	.04¾
drs, c-l, f.o.b. wks, frt all'd lb.	...	.07	.05¾	.07	...	.05¾
Acetyl chloride, 100 lb cbys lb	.55	.68	.55	.68	.55	.68
ACIDS						
Abietic, kgs, bbls ... lb	.08¾	.09	.08¾	.09	.08¾	.10
Acetic, 28%, 400 lb bbls, c-l, wks 100 lbs	...	2.23	...	2.23	...	2.23
glacial, bbls, c-l, wks 100 lbs.	...	7.62	...	7.62	...	7.62
glacial, USP bbls, c-l, wks. 100 lbs.	...	10.25	...	10.25	...	10.25
Acetylsalicylic, USP, 225 lb bbls ... lb.	...	.40	.40	.50	.50	.60
Adipic, kgs, bbls ... lb.	...	.72	...	.72	...	.72
Anthranilic, ref'd, bbls.. lb.	1.15	1.20	1.15	1.20	1.15	1.20
tech bbls ... lb.	...	.75	..	.75	...	.75
Ascorbic, bot ... oz.	2.75	3.00	2.75	3.25	...	...
Battery, cbys, wks ...100 lbs.	1.60	2.55	1.60	2.55	1.60	2.55
Benzoic tech, 100 lb kgs lb.	.43	.47	.43	.47	.43	.47
USP, 100 lb kgs ... lb.	.54	.59	.54	.59	.54	.59
Boric, tech, gran, 80 tons, bgs, delv ... ton *a*	...	96.00	...	96.00	95.00	96.00
Broenner's, bbls ... lb.	...	1.11	...	1.11	...	1.11
Butyric, edible, c-l, wks, cbys lb.	1.20	1.30	1.20	1.30	1.20	1.30
synthetic, c-l, drs, wks.. lb.	...	.22	...	.22	...	.22
wks, lcl ... lb.	...	.23	...	.23	...	.23
tks, wks ... lb.	...	.21	...	.21	...	.21
Camphoric, drs ... lb.	5.50	5.70	5.50	5.70	5.50	5.70
Caproic, normal, drs. ... lb.	...	.35	...	.35	...	...
Chicago, bbls ... lb.	...	2.10	...	2.10	...	2.10
Chlorosulfonic, 1500 lb drs, wks ... lb.	.03½	.05	.03½	.05	.03½	.05
Chromic, 99¾%, drs, delv lb.	.15¼	.17¼	.15¼	.17¼	.15¼	.17¼
Citric, USP, crys, 230 lb bbls. ... lb. *b*	.20	.21½	.20	.22½	.22	.25
anhyd, gran, bbls ... lb. *b*	...	.23	.23	.25	.25½	.26½
Cleve's, 250 lb bbls ... lb.	...	.57	...	.57	.50	.57
Cresylic, 99%, straw, HB, drs, wks, frt equal gal.	.58	.60	.49	.64	.63	.91
99%, straw, LB, drs, wks, frt equal ... gal.	.63	.70	.55	.71	.69	.94
resin grade, drs, wks, frt equal ... lb.	.08¼	.09¼	.08¼	.09½	.09	.11¼
Crotonic, bbls, delv ... lb.	.21	.50	.21	.50	.21	1.00
Formic, tech, 140 lb drs..lb.	.10½	.11½	.10½	.11½	.10½	.11½
Fumaric, bbls ... lb.	...	.75	...	.75	.60	.75
Fuming, see Sulfuric (Oleum)						
Gallic, tech, bbls ... lb.	.70	.73	.70	.73	.70	.79
USP, bbls ... lb.	.77	.81	.77	.81	.77	.91
Gamma, 225 lb bbls, wks lb.	...	.85	...	.85	...	.85
H, 225 lb bbls, wks .. lb.	.50	.55	.50	.55	.50	.55
Hydriodic, USP, 47% ... lb.	...	2.30	...	2.30	2.20	2.30
Hydrobromic, 34% conct 155 lb cbys, wks ... lb.	.42	.44	.42	.44	.42	.44
Hydrochloric, see muriatic						
Hydrocyanic, cyl, wks lb.	.80	1.30	.80	1.30	.80	1.30
Hydrofluoric, 30%, 400 lb bbls, wks ... lb.	.06	.06½	.06	.07½	.07	.07½
Hydrofluosilicic, 35%, 400 bbls, wks ... lb.	.09	.09½	.09	.09½	.09	.15
Lactic, 22%, dark, 500 lb bbls lb.	.02½	.02¾	.02½	.02¾	.02½	.02¾
22%, light ref'd, bbls lb.	.03½	.03¾	.03½	.03¾	.03½	.03¾
44%, light, 500 lb bbls .lb.	.05½	.05¾	.05½	.05¾	.05½	.05¾
44%, dark, 500 lb bbls .lb.	.06½	.06¾	.06½	.06¾	.06½	.06¾
50%, water white, 500 lb bbls ... lb.	.10½	.11½	.10½	.11½	.10½	.11½
USP X, 85%, cbys ... lb.	.42	.45	.42	.45	.42	.45
Lauric, drs. ... lb.	11¾	.12¼	.11¾	.12¼	.08½	.12¼
Laurent's, 250 lb bbls ...lb.	.45	.46	.45	.46	.45	.46
Levulinic, 5 lb bot wks ...lb.	...	2.00	...	2.00	...	2.00
Linoleic, bbls ... lb.	...	.20	..	.20	...	.20
Maleic, powd, kgs ... lb.	.30	.40	.30	.40	.30	.40
Malic, powd, kgs ... lb.	.45	.60	.45	.60	.45	.60
Metanillic, 250 lb bbls ...lb.	.60	.65	.60	.65	.60	.65
Mixed, tks, wks ... N unit	.06½	.07¼	.06½	.07¼	.06½	.07¼
S unit	.008	.009	.008	.009	.008	.009
Monochloracetic, tech, bbls lb.	.16	.18	.16	.18	.16	.18
Monosulfonic, bbls ... lb.	1.50	1.60	1.50	1.60	1.50	1.60
Muriatic, 18°, 120 lb cbys, c-l, wks ... 100 lb.	...	1.50	...	1.50	...	1.50
tks, wks ... 100 lb.	...	1.00	...	1.00	...	1.00
20°, cbys, c-l, wks..100 lb.	...	1.75	...	1.75	...	1.75
tks, wks ... 100 lb.	...	1.10	...	1.10	...	1.10
22°, c-l, cbys, wks..100 lb.	...	2.25	...	2.25	...	2.25
tks, wks ... 100 lb.	...	1.60	...	1.60	...	1.60
CP, cbys ... lb.	.06½	.07½	.06½	.07½	.06½	.07½
N & W, 250 lb bbls ... lb.	.85	.87	.85	.87	.85	.87
Naphthenic, 240-280 s.v., drs lb.	.14	nom.	.10	.14	.10	.13
Naphthionic, tech, 250 lb bbls lb.	.60	.65	.60	.65	.60	.65
Nitric, 36°, 135 lb cbys, c-l, wks ... 100 lb. *c*	...	5.00	...	5.00	...	5.00
38°, c-l, cbys, wks 100 lb. *c*	...	5.50	...	5.50	...	5.50
40°, cbys, c-l, wks 100 lb. *c*	...	6.00	...	6.00	...	6.00
42°, c-l, cbys, wks 100 lb, *c*	...	6.50	...	6.50	...	6.50
CP, cbys, delv ... lb.	.11½	.12½	.11½	.12½	.11½	.12½
Oxalic, 300 lb bbls, wks, or N Y ... lb.	.10¾	.12	.10¾	.12	.10¾	.12
Phosphoric, 85%, USP, cbys lb.	.12	.14	.12	.14	.12	.14
50%, acid, c-l, drs, wks .lb.	.06	.08	.06	.08	.06	.08
75%, acid, c-l, drs, wks .lb.	...	.07½	...	.07½	.07½	.10½
Picramic, 300 lb bbls, wks lb.	.65	.70	.65	.70	.65	.70
Picric, kgs, wks ... lb.	.35	.40	.35	.40	.35	.40
Propionic, 98% wks, drs..lb.	...	.22	...	.22	...	.22
80% ... lb.	.16	.17½	.16	.17½	.16	.17½
Pyrogallic, tech, lump, pwd, bbls ... lb.	...	1.05	...	1.05	...	1.05
cryst, USP ... lb.	1.45	1.63	1.45	1.63	1.45	1.63
Ricinoleic, bbls ... lb.	...	.35	...	.35	.35	.38
tech, bbls ... lb.	...	.13	...	.13	...	.13
Salicylic, tech, 125 lb bbls, wks ... lb.	...	.33	...	.33	...	.33
USP, bbls ... lb.	.35	.40	.35	.40	.35	.45
Sebacic, tech, drs, wks .. lb.	...	nom.	...	nom.	.37	.41
Succinic, bbls ... lb.	...	.75	...	.75	...	.75
Sulfanilic, 250 lb bbls, wks lb.	.17	.18	.17	.18	.17	.18
Sulfuric, 60°, tks, wks ...ton	...	13.00	...	13.00	...	13.00
c-l, cbys, wks ...100 lb.	...	1.25	...	1.25	...	1.25
66°, tks, wks ... ton	...	16.50	...	16.50	...	16.50
c-l, cbys, wks ....100 lb.	...	1.50	...	1.50	...	1.50
CP, cbys, wks ... lb.	.06½	.07½	.06½	.07½	.06½	.07½
Fuming (Oleum) 20% tks, wks ... ton	...	18.50	...	18.50	..	18.50
Tannic, tech, 300 lb bbls..lb.	.40	.47	.40	.47	.40	.47
Tartaric, USP, gran, powd, 300 lb bbls ... lb.	.31¼	.31¾	.27¼	.31¾	.24¼	.27¾
Tobias, 250 lb bbls ... lb.	.55	.60	.55	.67	.65	.67
Trichloroacetic bottles ...lb.	2.00	2.50	2.00	2.50	2.00	2.50
kgs ... lb.	...	1.75		1.75		1.75
Tungstic, tech, bbls ... lb.	...	...	1.70	1.80	1.65	2.00
Vanadic, drs, wks ... lb.	...	...	1.10	1.20	1.10	1.20
Albumen, light flake, 225 lb. bbls ... lb.	.55	.68	.52	.68	.52	.60
dark, bbls ... lb.	.13	.18	.13	.18	.11	.18
egg, edible ... lb.	.64	.68	.58	.78	.77	1.15
ALCOHOLS						
Alcohol, Amyl (from Pentane) tks, delv ... lb.	...	.101	...	.101	.101	.106
c-l, drs, delv ... lb.	...	.111	...	.111	.111	.116
lcl, drs, delv ... lb.	...	.121	...	.121	.121	.126
Amyl, secondary, tks, delv lb.	...	.08½	...	.08½	...	.08½
drs, c-l, delv E. of Rockies ... lb.	...	.09½	...	.09½	..	.09½
Benzyl, cans ... lb.	.68	1.00	.68	1.00	.68	1.00
Butyl, normal, tks, f.o.b. wks, frt all'd ... lb. *d*	...	.08	.07	.08½	.08½	.09
c-l, drs, f.o.b. wks, frt all'd ... lb. *d*	...	.09	.08	.09½	.09½	.10
Butyl, secondary, tks, delv ... lb. *d*	...	.05½	.05½	.06	...	.06
c-l, drs, delv ... lb. *d*	...	.06½	.06½	.07	...	.07
Capryl, drs, tech, wks lb.	..	.85	..	.85	...	.85
Cinnamic, bottles ... lb.	2.00	2.50	2.00	2.50	2.00	2.50
Denatured, CD, 14, c-l, drs, wks ... gal. *e*	.31½	.36½	.27½	.36½	.31	.35
tks, East, wks ... gal.	...	.25½	.21½	.25½	.23	.29
Western schedule, c-l drs, wks ... gal. *e*		.34½	.34½	.37	.36	.38
Denatured, SD, No. 1, tks.	...	.21½	.19½	.22	.22	.27
c-l, drs, wks ... gal. *e*	...	.27½	.25½	.28	.28	.33

a Powdered boric acid $5 a ton higher in each case; USP $15 higher; *b* Powdered citric is ½c higher; kegs are in each case ½c higher than bbls.; *y* Price given is per gal.

c Yellow grades 25c per 100 lbs. less in each case; *d* Spot prices are 1c higher; *e* Anhydrous is 5c higher in each case; *f* Pure prices are 1c higher in each case.

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.



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Chemicals for Industry

CHINA WOOD OIL SUBSTITUTIONS

Often market conditions make it imperative that a large proportion of tung oil in many formulations be replaced by the softer oils. To accomplish this without too seriously affecting viscosity, drying time, hardness and water resistance requires synthetic resins with particular properties.

The following suggestions are offered as a broad approach to this difficult problem:

AROCHEM 65 . . . . With LINSEED oil

AROCHEM 115, **AROCHEM 520**, **AROFENE 700** . . . With PERILLA and DEHYDRATED CASTOR oils

AROCHEM 120 . . . . With OITICICA and DEHYDRATED CASTOR oils

Further details are available

THE COMPLETE RESIN LINE

ESTER GUM—*all types* **"AROCHEM"**—*modified types* **"AROFENE"**—*pure phenolics* **"AROPLAZ"**—*alkyds*

NATURAL RESINS—*all standard grades*

STROOCK & WITTENBERG CORPORATION

NEW YORK, N. Y.

		Current Market	1939 Low	1939 High	1938 Low	1938 High
Alcohols (continued):						
Diacetone, pure, c-l, drs, delv	lb. *f*	...	.09	.09	.11½	... .11½
tech, contract, drs, c-l, delv	lb.	...	.08½	.08½	.10½	... .10½
Ethyl, 190 proof, molasses, tks	gal. *g*	...	4.48	4.46	4.48½	4.04 4.51½
c-l, drs	gal. *g*	...	4.54	4.49	4.54½	4.10 4.59½
c-l, bbls	gal. *g*	...	4.55	4.53	4.55½	4.11 4.58½
Furfuryl, tech, 500 lb drs	lb.	.25	.35	.25	.35	.25 .35
Hexyl, secondary tks, delv	lb.	...	.12	...	.12	... .12
c-l, drs, delv	lb.	...	.13	...	.13	... .13
Normal, drs, wks	lb.	3.25	3.50	3.25	3.50	3.25 3.50
Isoamyl, prim, cans, wks	lb.	...	.32	...	.32	... .32
drs, lcl, delv	lb.	...	.27	...	.27	... .27
Isobutyl, ref'd, lcl, drs	lb.	...	.073	.073	.09	.09 .10
c-l, drs	lb.	...	.068	.068	.08½	.08½ .09½
tks	lb.	...	.058	.058	.07½	.07½ .08½
Isopropyl, ref'd, 91%, c-l, drs, f.o.b. wks, frt all'd	lb.	...	.36	...	.36	... .36
Ref'd 98%, drs, f.o.b. wks, frt all'd	gal.	...	.41	...	.41	... .41
Tech 91%, drs, above terms	gal.	...	.33½	...	.33½	... .33½
tks, same terms	gal.	...	.28½	...	.28½	... .28½
Tech 98%, drs, above terms	gal.	...	.37½	...	.37½	... .37½
tks, above terms	gal.	...	.32½	...	.32½	... .32½
Spec Solvent, tks, wks	gal.	...	.22½	.19	.23	.23 .28
Aldehyde ammonia, 100 gal drs	lb.	.80	.82	.80	.82	.80 .82
Aldehyde Bisulfite, bbls, delv	lb.	...	.17	...	.17	... .17
Aldol, 95%, 55 and 110 gal, drs, delv	lb.	.11	.12	.11	.20	... .20
Alphanaphthol, crude, 300 lb bbls	lb.	...	.52	...	.52	... .52
Alphanaphthylamine, 350 lb bbls	lb.	.32	.34	.32	.34	.32 .34
Alum, ammonia, lump, c-l, bbls, wks	100 lb.	3.40	3.65	3.40	3.65	3.40 3.65
delv NY, Phila	100 lb.	...	3.40	...	3.40	... 3.40
Granular, c-l, bbls wks	100 lb.	3.15	3.40	3.15	3.40	3.15 3.40
Powd, c-l, bbls, wks	100 lb.	...	3.55	...	3.55	... 3.55
Chrome, bbls	100 lb.	6.50	6.75	6.50	6.75	6.50 6.75
Potash, lump, c-l, bbls, wks	100 lb.	3.65	3.90	3.65	3.90	3.65 3.90
Granular, c-l, bbls, wks	100 lb.	3.40	3.65	3.40	3.65	3.40 3.65
Powd, c-l, bbls, wks	100 lb.	3.80	4.05	3.80	4.05	3.80 4.05
Soda, bbls, wks	100 lb.	...	3.25	...	3.25	... 3.25
Aluminum metal, c-l, NY	100 lb.	...	20.00	...	20.00	... 20.00
Acetate, 20%, bbls	lb.	.07½	.09	.07½	.09	.07½ .10
Basic powd, bbls, delv.	lb.	.40	.50	.40	.50	.40 .50
Chloride anhyd, 99%, wks	lb.	.07	.12	.07	.12	.07 .12
93%, wks	lb.	.05	.08	.05	.08	.05 .08
Crystals, c-l, drs, wks	lb.	.06	.06¼	.06	.06¼	.06 .06¼
Solution, drs, wks	lb.	.02¾	.03¼	.02¾	.03¼	.02¾ .03¼
Formate, 30% sol bbls, c-l, delv	lb.	...	.13	...	.13	... .13
Hydrate, 96%, light, 90 lb bbls, delv	lb.	.12½	.13½	.11½	.13	.12 .13
heavy, bbls, wks	lb.	.029	.03½	.029	.03½	.029 .03½
Oleate, drs	lb.	.16¾	.18½	.16¾	.18½	.16¾ .18½
Palmitate, bbls	lb.	...	.24½	.23	.24½	... .23
Resinate, pp., bbls	lb.	...	.15	...	.15	... .15
Stearate, 100 lb. bbls	lb.	.17½	.22½	.16	.22½	.19 .21
Sulfate, com, c-l, bgs, wks	100 lb.	...	1.15	...	1.15	1.15 1.35
c-l, bbls, wks	100 lb.	...	1.35	...	1.35	1.35 1.55
Sulfate, iron-free, c-l, bgs, wks,	100 lb.	...	1.45	...	1.45	... 1.30
c-l, bbls, wks	100 lb.	...	1.65	...	1.65	... 1.50
Aminoazobenzene, 110 lb kgs	lb.	...	1.15	...	1.15	... 1.15
Ammonia anhyd fert com, tks	lb.	.04½	.05½	.04½	.05½	.04½ .05½
Ammonia anhyd, 100 lb cyl	lb.	.16	.22	.16	.22	.16 .22
26°, 800 lb drs, delv	lb.	.02¼	.02½	.02¼	.02½	.02¼ .02½
Aqua 26°, tks, NH	cont.	...	.04z	...	.04z	... .05**
tk wagon	lb.	...	.02	...	.02	... .02
Ammonium Acetate, kgs	lb.	.26	.33	.26	.33	.26 .33
Bicarbonate, bbls, f.o.b. wks	100 lb.	...	5.56	5.15	5.71	5.15 5.71
Bifluoride, 300 lb bbls	lb.	.14½	.16½	.14½	.16½	.14½ .17
carbonate, tech, 500 lb bbls	lb.	.08	.12	.08	.12	.08 .12
Chloride, White, 100 lb bbls, wks	100 lb.	4.45	4.90	4.45	4.90	4.45 4.90
Gray, 250 lb bbls, wks	100 lb.	5.50	6.25	5.50	6.25	5.50 6.25
Lump, 500 lb cks spot	lb.	.10½	.11	.10½	11.	.10½ .11
Lactate, 500 lb bbls	lb.	.15	.16	.15	.16	.15 .16
Laurate, bbls	lb.	...	.23	...	.23	... .23
Linoleate, 80% anhyd, bbls	lb.	...	.15	...	.15	... .15
Naphthenate, bbls	lb.	...	.17	...	.17	... .17
Nitrate, tech, bbls	lb.	...	.0455	.036	.0455	.038 .0405
Oleate, drs	lb.	...	.15	...	.15	... .15
Oxalate, neut, cryst, powd, bbls	lb.	.19	.20	.19	.20	.19 .22½
Perchlorate, kgs	lb.	...	.16	...	.16	... .16
Persulfate, 112 lb kgs	lb.	.21	.24	.21	.24	.21 .24
Phosphate, dibasic tech, powd, 325 lb bbls	lb.	.07½	.10	.07½	.10	.07½ .10
Ricinoleate, bbls	lb.	...	.15	...	.15	... .15
Stearate, anhyd, bbls	lb.	...	.22	.22	.24	... .24
Paste, bbls	lb.	...	.06½	.06½	.08	... .07½

g Grain alcohol 25c a gal. higher in each case. **On a delv. basis.
z On a f.o.b. wks. basis.

		Current Market	1939 Low	1939 High	1938 Low	1938 High
Ammonium (continued):						
Sulfate, dom, f.o.b., bulk	ton	...	27.50	27.00	28.00	27.00 28.50
Sulfocyanide, pure, kgs	lb.	...	.55	...	.55	... .55
Amyl Acetate (from pentane) tks, delv	lb.	...	.095	.095	.10	.10 .11½
c-l, drs, delv	lb.	...	.105	.105	.11	... ...
lcl, drs, delv	lb.	...	.115	.115	.112	... ...
tech, drs, delv	lb.	...	.12½	.10½	.12½	.11 .10½
Secondary, tks, delv.	lb.	...	.08½	...	.08½	... .08½
c-l, drs, delv	lb.	...	.09½	...	.09½	... .09½
tks, delv	lb.	...	.08½	...	.08½	... .08½
Chloride, norm, drs, wks	lb.	.56	.68	.56	.68	.56 .68
mixed, drs, wks	lb.	.0565	.0665	.0565	.077	.07 .077
tks, wks	lb.	...	.0465	.0465	.06	... .06
Mercaptan, drs, wks	lb.	...	1.10	...	1.10	... 1.10
Oleate, lcl, wks, drs	lb.	...	.25	...	.25	... .25
Stearate, lcl, wks, drs	lb.	...	.26	...	.26	... .26
Amylene, drs, wks	lb.	.102	.11	.102	.11	.102 .11
tks, wks	lb.	...	.09	...	.09	... .09
Aniline Oil, 960 lb drs and tks	lb.	.14½	.17½	.14½	.17½	.14½ .17½
Annatto fine	lb.	.34	.39	.34	.39	.34 .37
Anthracene, 80%	lb.	...	.55	.55	.75	... .75
Anthraquinone, sublimed, 125 lb bbls	lb.	...	.65	...	.65	... .65
Antimony metal slabs, ton lots	lb.	.14	nom.	.11¼	.14	.10¾ .14
Butter of, see Chloride.						
Chloride, soln, cbys	lb.	...	.17	...	.17	... .17
Needle, powd, bbls	lb.	.20	nom.	.12	.20	.12½ .16
Oxide, 500 lb bbls	lb.	.15¾	nom.	.10	.15¾	.11½ .16½
Salt, 63% to 65%, tins	lb.	.38	nom.	.25¾	.38	.26 .27
Archil, conc, 600 lb bbls	lb.	.21	.27	.21	.27	.21 .27
Double, 600 lb bbls	lb.	.18	.20	.18	.20	.18 .20
Aroclors, wks	lb.	.18	.30	.18	.30	.18 .30
Arrowroot, bbls	lb.	.08½	.09	.08½	.09	.08½ .09
Arsenic, Metal	lb.	...	...	.40	.60	.40 .44
Red, 224 lb cs kgs	lb.	.18	nom.	...	.18	... .15¾
White, 112 lb kgs	lb.	.03	.03¾	.03	.03¾	.03 .04

B

Barium Carbonate precip, 200 lb bgs, wks	ton	52.50	62.50	52.50	62.50	52.50	62.50
Nat (witherite) 90% gr, c-l, wks, bgs	ton	45.00	47.00	41.00	47.00	41.00	44.00
Chlorate, 112 lb kgs, NY	lb.	.19	nom.	.16½	.19	.16½	.17½
Chloride, 600 lb bbls, delv, zone 1	ton	77.00	92.00	77.00	92.00	77.00	.92.00
Dioxide, 88%, 690 lb drs	lb.	.11	.12	.11	.12	.11	.12
Hydrate, 500 lb bbls	lb.	.04½	.05	.04½	.05½	.04¾	.05½
Nitrate, bbls	lb.	.10½	nom.	.06¾	.10½	.06¾	.08¼
Barytes, floated, 350 lb bbls c-l, wks	ton	...	.23.65	...	23.65	...	23.65
Bauxite, bulk, mines	ton	7.00	10.00	7.00	10.00	7.00	10.00
Bentonite, c-l, 325 mesh, bgs, wks	ton	...	16.00	...	16.00	...	16.00
200 mesh	ton	...	11.00	...	11.00	...	11.00
Benzaldehyde, tech, 945 lb. drs, wks	lb.	.60	.62	.60	.62	.60	.62
Benzene (Benzol), 90%, Ind. 8000 gal tks, ft all'd	gal.	...	.16	...	.16	...	.16
90% c-l, drs	gal.	...	.21	...	.21	...	.21
Ind pure, tks, frt all'd	gal.	...	.16	...	.16	...	.16
Benzidine Base, dry, 250 lb bbls	lb.	.70	.72	.70	.72	.70	.72
Benzoyl Chloride, 500 lb drs	lb.	.40	.45	.40	.45	.40	.45
Benzyl Chloride, 95-97% rfd, drs	lb.	.30	.40	.30	.40	.30	.40
Tech, drs	lb.	.25	.26	.25	.26	.25	.26
Beta-Naphthol, 250 lb bbls, wks	lb.	.23	.24	.23	.24	.23	.24
Naphthylamine, sublimed, 200 lb bbls	lb.	1.25	1.35	1.25	1.35	1.25	1.35
Tech, 200 lb bbls	lb.	.51	.52	.51	.52	.51	.52
Bismuth metal	lb.	...	1.25	1.05	1.25	1.00	1.10
Chloride, boxes	lb.	3.20	3.25	3.20	3.25	3.20	3.25
Hydroxide, boxes	lb	3.35	3.40	3.15	3.40	3.15	3.20
Oxychloride, boxes	lb.	...	3.10	2.95	3.10	...	2.95
Subbenzoate, boxes	lb.	3.25	3.30	3.25	3.30	3.25	3.30
Subcarbonate, kgs	lb.	1.73	1.76	1.43	1.76	1.13	1.58
Trioxide, powd, boxes	lb.	...	3.57	...	3.57	...	3.57
Subnitrate, fibre, drs	lb.	1.48	1.51	1.23	1.51	1.03	1.48
Blanc Fixe, 400 lb bbls, wks	ton *h*	40.00	75.00	40.00	75.00	40.00	75.00
Bleaching Powder, 800 lb drs, c-l, wks, contract	100 lb.	...	2.00	...	2.00	...	2.00
lcl, drs, wks	lb.	2.25	3.60	2.25	3.60	2.25	3.60
Blood, dried, f.o.b., NY	unit	...	3.70	2.50	4.25	2.50	3.25
Chicago, high grade	unit	...	3.60	2.30	4.25	2.35	3.35
Imported shipt	unit	...	3.35	2.65	3.90	2.90	3.45
Blues, Bronze Chinese Milori							
Prussian Soluble	lb.	.36	.37	.36	.37	.36	.37
Ultramarine,* dry, wks, bbls	lb.	...	.11	...	.11	...	.11
Regular grade, group 1	lb.	...	.16	...	.16	...	.16
Special, group 1	lb.	...	.19	...	.19	...	.19
Pulp, No. 1	lb.	...	.27	...	.27	...	.27
Bone, 4½ + 50% raw, Chicago	ton	...	31.00	27.00	34.00	25.50	30.00
Bone Ash, 100 lb kgs	lb.	.06	.07	.06	.07	.06	.07
Black, 200 lb bbls	lb.	.06½	.08¼	.06½	.08¼	.06½	.08¼
Meal, 3% & 50%, imp	ton	27.00	nom.	22.00	27.00	20.50	23.75
Domestic, bgs, Chicago	ton	...	32.00	24.00	32.00	16.00	26.00
Borax, tech, gran, 80 ton lots, sacks, delv	ton *i*	...	43.00	...	43.00	42.00	43.00
bbls, delv	ton *i*	...	53.00	...	53.00	52.00	53.00

h Lowest price is for pulp, highest for high grade precipitated; *i* Crystals $6 per ton higher; USP, $15 higher in each case; *Freight is equalized in each case with nearest producing point.

ABC

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Tank Cars Drums Carboys

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180 MADISON AVE., NEW YORK, N.Y.

Church & Dwight Co., Inc.

Established 1846

70 PINE STREET NEW YORK

Bicarbonate of Soda

Sal Soda

Monohydrate of Soda

Standard Quality

		Current Market	1939 Low	1939 High	1938 Low	1938 High
Borax (continued)						
Tech, powd, 80 ton lots, sacks	ton *i*	...	47.00	... 47.00	...	47.00
bbls, del	ton *i*	...	57.00	... 57.00	...	57.00
Bordeaux Mixture, drs	lb.	.11	.11½	.11 .11½	.11	.11½
Bromine, cases	lb.	.30	.43	.30 .43	.30	.43
Bronze, Al, pwd, 300 lb drs	lb.	.90½	.92½	.90½ .92½	.90½	.92½
Gold, blk	lb.	.45	.65	.45 .65	.45	.65
Butanes, com 16-32° group 3 tks	lb.	.02¼	.03¾	.02¼ .03¾	.02¼	.03¾
Butyl, Acetate, norm drs, frt allowed	lb.	...	.08	.08 .09½	.09½	.10½
tks, frt allowed	lb.	...	.07	.07 .08½	.08½	.09
Secondary, tks, frt allowed	lb.	...	.05½	.05½ .06½	.06½	.07
drs, frt allowed	lb.	.065	.07	.068 .08	.07½	.08½
Aldehyde, 50 gal drs, wks	lb.	.15½	.17½	.15½ .17½	.16½	.17½
Carbinol, norm drs, wks	lb.	.60	.75	.60 .75	.60	.75
Crotonate, norm, 55 and 110 gal drs, delv	lb.	...	.35	.35 .75	...	...
Lactate	lb.	.22½	.23½	.22½ .23½	.22½	.23½
Oleate, drs, frt allowed	lb.	...	.25	... .25	...	.25
Propionate, drs	lb.	.16½	.17	.16½ .18½	.18	.18½
tks, delv	lb.	...	.15½	.15½ .17	...	.17
Stearate, 50 gal drs	lb.	...	.26	... .26	...	.26
Tartrate, drs	lb.	.55	.60	.55 .60	.55	.60
Butyraldehyde, drs, lcl, wks	lb.	...	.35½	... .35½	...	.35½
C						
Cadmium Metal	lb.	.75	.80	.50 .85	.85	1.60
Sulfide, orange, boxes	lb.	.75	.85	.75 .90	.80	1.60
Calcium, Acetate, 150 lb bgs c-l, delv	100 lb.	...	1.90	1.65 1.90	...	1.65
Arsenate, c-l, E. of Rockies, dealers, drs	lb.	.06¾	.07¼	.06¾ .07¼	.06¾	.07¼
Carbide, drs	lb.	.05	.06	.05 .06	.05	.06
Carbonate, tech, 100 lb bgs c-l	lb.	...	1.00	... 1.00	...	1.00
Chloride, flake, 375 lb drs, burlap bgs, c-l, delv	ton	...	22.00	... 22.00	22.00	23.50
paper bgs, c-l, delv	ton	23.00	36.00	23.00 36.00	23.00	36.00
Solid, 650 lb drs, c-l, delv	ton	...	20.00	... 20.00	20.00	21.50
Ferrocyanide, 350 lb bbls wks	lb.	...	.17	... .17	...	.17
Gluconate, Pharm, 125 lb bbls	lb.	.50	.57	.50 .57	.50	.57
Levulinate, less than 25 bbl lots, wks	lb.	...	3.00	... 3.00	...	3.00
Nitrate, 100 lb bgs	ton	...	28.00	... 28.00	...	28.00
Palmitate, bbls	lb.	.22	.23	.22 .23	.22	.23
Phosphate, tribasic, tech, 450 lb bbls	lb.	.06½	.07½	.06½ .07½	.06½	.07½
Resinate, precip, bbls	lb.	.13	.14	.13 .14	.13	.14
Stearate, 100 lb bbls	lb.	.19	.21	.19 .21	.19	.21
Camphor, slabs	lb.	.65	.66	.46 .75	.52	.56
Powder	lb.	.65	.66	.45 .75	.52	.56
Carbon Bisulfide, 500 lb drs	lb.	.05	.05¾	.05 .05¾	.05	.05¾
Black, c-l, bgs, delv, price varying with zone†	lb.	.02¾	.03¾	.02¾ .03¾	.027	.0380
lcl, bgs, f.o.b. whse	lb.	...	.06¼	... .06¼	.05¾	.06¼
cartons, f.o.b. whse	lb.	...	.06¼	... .06¼	...	.06¼
cases, f.o.b. whse	lb.	...	.07	... .07	...	.07
Decolorizing, drs, c-l	lb.	.08	.15	.08 .15	.08	.15
Dioxide, Liq 20-25 lb cyl	lb.	.06	.08	.06 .08	.06	.08
Tetrachloride, 55 or 110 gal drs, c-l, delv	lb.	.05	.05½	.05 .05½	.05	.06
Casein, Standard, Dom, grd	lb.	.20	.23	.07 .23	.06½	.13½
80-100 mesh, c-l, bgs	lb.	.20½	nom.	.07½ .23½	.07	.14
Castor Pomace, 5½ NH_3, c-l, bgs, wks	ton	...	17.50	.16.50 18.50	18.50	21.00
Imported, ship, bgs	ton	...	20.00	18.00 20.00	20.00	21.00
Celluloid, Scraps, ivory cs	lb.	.12	.15	.12 .15	.12	.15
Transparent, cs	lb.	...	.20	... .20	...	.20
Cellulose, Acetate, 50 lb kgs	lb.	...	.35	.35 .36	.36	.40
Chalk, dropped, 175 lb bbls	lb.	.02¾	.03¾	.02¾ .03¾	.02¾	.03¾
Precip, heavy, 560 lb cks	lb.	.02¾	.03¼	.02¾ .03¼	.02¼	.04
Light, 250 lb cks	lb.	.03¼	.04	.03¼ .04	.03¼	.04
Charcoal, Hardwood, lump, blk, wks	bu.	...	.15	... .15	...	.15
Softwood, bgs, delv*	ton	25.00	36.00	23.00 36.00	23.00	34.00
Willow, powd, 100 lb bbls, wks	lb.	.06	.07	.06 .07	.06	.07
Chestnut, clarified, tks, wks	lb.	...	.01⅝	... .01⅝	.01⅝	.02125
25%, bbls, wks	lb.	...	.02	... .02	.02	.0225
Pwd, 60%, 100 lb bgs, wks	lb.	...	.04½	... .04½	.04½	.04⅞
China Clay, c-l, blk mines	ton	...	7.60	7.00 7.60	...	7.00
Imported, lump, blk	ton	26.00	nom.	22.00 26.00	22.00	25.00
Chlorine, cyls, lcl, wks, contract	lb.	.07½	.08½	.07½ .08½	.07½	.08½
cyls, c-l, contract	lb. *j*	...	.05¼	.05¼ .05½	...	.05½
Liq, tk, wks, contract 100 lb.		...	1.75	1.75 2.00	2.00	2.15
Multi, c-l, cyls, wks, cont	lb.	...	1.90	1.90 2.15	2.30	2.55
Chloroacetophenone, tins, wks	lb.	3.00	3.50	3.00 3.50	3.00	3.50
Chlorobenzene, Mono, 100 lb drs, lcl, wks	lb.	.06	.07½	.06 .07½	.06	.07½
Chloroform, tech, 1000 lb drs	lb.	.20	.21	.20 .21	.20	.21
USP, 25 lb tins	lb.	.30	.31	.30 .31	.30	.31
Chloropicrin, comml cyls	lb.	...	.80	... .80	...	.80
Chrome, Green, CP	lb.	.21	.25	.21 .25	.21	.25
Yellow	lb.	.14½	.15½	.14½ .15½	.14½	.15½

j A delivered price; * Depends upon point of delivery; † New bulk price, tank cars ¼c per lb. less than bags in each zone.

		Current Market	1939 Low	1939 High	1938 Low	1938 High
Chromium Acetate, 8% Chrome, bbls	lb.	.05	.08	.05 .08	.05	.08
Fluoride, powd, 400 lb bbl	lb.	.27	.28	.27 .28	.27	.28
Coal tar, bbls	bbl.	7.50	8.00	7.50 8.00	7.50	8.00
Cobalt Acetate, bbls	lb.	.65	.67	.65 .67	.65	.68
Carbonate tech, bbls	lb.	1.25	1.60	1.25 1.63	...	1.63
Hydrate, bbls	lb.	...	1.78	... 1.78	1.36	1.78
Linoleate, solid, bbls	lb.	...	.33	... .33	...	.33
paste, 6%, drs	lb.	...	.31	.31	...	.31
Oxide, black, bgs	lb.	...	1.84	1.67 1.84	...	1.67
Resinate, fused, bbls	lb.	...	.13½	... .13½	...	.13½
Precipitated, bbls	lb.	...	.34	... .34	...	.34
Cochineal, gray or bk bgs	lb.	.35	.38	.35 .38	.35	.38
Teneriffe silver, bgs	lb.	.36	.39	.36 .39	.36	.39
Copper, metal, electrol 100 lb	lb.	...	12.50	10.00 12.50	9.00	11.25
Acetate, normal, bbls, wks	lb.	.22	.24	.21 .24	.21	.23
Carbonate, 52-54% 400 lb bbls	lb.	.169	nom.	.14½ .169	.1340	.16¾
Chloride, 250 lb bbls	lb.	.18	nom.	.12½ .18	.12½	.17
Cyanide, 100 lb drs	lb.	...	.34	.34	.34	.38
Oleate, precip, bbls	lb.	...	.20	.20	...	.20
Oxide, black, bbls, wks	lb.	.18¾	nom.	.15 .18¾	.13½	.17¾
red 100 lb bbls	lb.	.20	nom.	.15¾ .20	.15	.19775
Sub-acetate verdigris, 400 lb bbls	lb.	.18	.19	.18 .19	.18	.19
Sulfate, bbls, c-l, wks 100 lb.		...	4.75	4.10 4.75	4.00	4.50
Copperas, crys and sugar bulk c-l, wks	ton	...	14.00	14.00	12.00	14.00
Corn Sugar, tanners, bbls 100 lb.		...	2.94	2.89 3.19	2.95	3.30
Corn Syrup, 42°, bbls 100 lb.		...	2.97	2.92 3.17	2.89	3.16
43°, bbls 100 lb.		...	3.02	2.97 3.22	2.94	3.21
Cotton, Soluble, wet, 100 lb bbls	lb.	.40	.42	.40 .42	.40	.42
Cream Tartar, powd & gran 300 lb bbls	lb.	.25¼	.25¾	.22¼ .25¾	.19¾	.23¼
Creosote, USP, 42 lb cbys	lb.	.45	.47	.45 .47	.45	.47
Oil, Grade 1 tks	gal.	.13½	.14	.13½ .14	.13½	.14
Grade 2	gal.	.122	.132	.122 .132	.122	.132
Cresol, USP, drs	lb.	.09½	.10	.09½ .10½	.10	.12½
Crotonaldehyde, 97%, 55 and 110 gal drs, wks	lb.	.11	.12	.11 .22*	.22*	.30*
Cutch, Philippine, 100 lb bale	lb.	...	.04	.04 .04½	.04	.06
Cyanamid, pulv, bags c-l, frt all'w'd, nitrogen basis, unit	D	...	1.27½	... ...	...	...
Derris root 5% rotenone, bbls	lb.	.24	.30	.24 .30	.34	.43
Dextrin, corn, 140 lb bgs f.o.b., Chicago	100 lb.	3.35	3.45	3.30 3.75	3.30	3.75
British Gum, bgs	100 lb.	3.60	3.70	3.55 3.95	3.55	4.00
Potato, Yellow, 220 lb bgs	lb.	.07⅜	.07¾	.07 .08¾	.07¼	.08¾
White, 220 lb bgs, lcl	lb.	.08½	.09	.08 .09	.08	.09
Tapioca, 200 bgs, lcl	lb.	...	.0715	... .0715	.0715	.08
White, 140 lb bgs	100 lb.	3.30	3.50	3.25 3.70	3.30	3.70
Diamylamine, c-l, drs, wks	lb.	...	.47	... .47	.47	.75
l.c.l. drs, wks	lb.	...	.50	... ...	...	...
tks, wks	lb.	...	.45	... ...	...	...
Diamylene, drs, wks	lb.	.095	.102	.095 .102	.095	.102
tks, wks	lb.	...	.08½	... .08½	...	.08½
Diamylether, wks, drs	lb.	.085	.092	.085 .092	.085	.092
tks, wks	lb.	...	.075	... .075	...	.075
Oxalate, lcl, drs, wks	lb.	...	.30	... .30	...	.30
Diamylphthalate, drs, wks	lb.	.21	.21½	.19 .21	.19	.21
Diamyl Sulfide, drs, wks	lb.	...	1.10	... 1.10	...	1.10
Diatomaceous Earth, see Kieselguhr.						
Dibutoxy Ethyl Phthalate, drs, wks	lb.	...	.35	... .35	...	.35
Dibutylamine, lcl, drs, wks	lb.	...	.53	.53 .55	...	.55
c.l. drs, wks	lb.	...	.50	... ...	...	...
tks, wks	lb.	...	.48	... ...	...	...
Dibutyl Ether, drs, wks, lcl	lb.	.24½	.25	.24½ .25	.25	.30
Dibutylphthalate, drs, wks, frt all'd	lb.	.19	.19½	.19 .19½	.19	.21
Dibutyltartrate, 50 gal drs	lb.	...	.50	.45 .54	.45	.54
Dichlorethylene, drs	lb.	...	.25	... .25	...	.25
Dichloroethylether, 50 gal drs, wks	lb.	.15	.16	.15 .16	.15	.16
tks, wks	lb.	...	.14	... .14	...	.14
Dichloromethane, drs, wks	lb.	...	.23	... .23	...	.23
Dichloropentanes, drs, wks	lb.	no prices		no prices	...	...
tks, wks		no prices		no prices	...	...
Diethanolamine, tks, wks	lb.	...	.23	... .23	...	.23
Diethylamine, 400 lb drs, lcl, f.o.b., wks	lb.	...	.70	.70 3.00	2.75	3.00
Diethylaniline, 850 lb drs	lb.	.40	.52	.40 .52	.40	.50
Diethyl Carbinol, drs	lb.	.60	.75	.60 .75	.60	.75
Diethylcarbonate, com drs	lb.	.31¾	.35	.31¾ .35	.31¾	.35
Diethylorthotoluidin, drs	lb.	.64	.67	.64 .67	.64	.67
Diethylphthalate, 1000 lb drs	lb.	.19	.19½	.19 .19½	.19	.19½
Diethylsulfate, tech, drs, wks, lcl	lb.	.13	.14	.13 .14	.13	.14
Diethyleneglycol, drs	lb.	.16	.17	.16 .17	.16	.17
Mono ethyl ethers, drs	lb.	.15	.16	.15 .16	.15	.16
tks, wks	lb.	...	.14	... .14	...	.14
Mono butyl ether, drs	lb.	.23	.24	.23 .24	.23	.24
tks, wks	lb.	...	.22	... .22	...	.22
Diethylene oxide, 50 gal drs, wks	lb.	.20	.24	.20 .24	.20	.24
Diglycol Laurate, bbls	lb.	.16	.17	.16 .23	...	.27½
Oleate, bbls	lb.	...	.13	.13 .20	...	.21
Stearate, bbls	lb.	...	.20	.20 .28	...	.27½
Dimethylamine, 400 lb drs, pure 25 & 40% sol 100% basis	lb.	...	1.00	... 1.00	...	1.00
Dimethylaniline, 340 lb drs	lb.	.23	.24	.23 .24	.23	.27
Dimethyl Ethyl Carbinol, drs	lb.	.60	.75	.60 .75	.60	.75

k Higher price is for purified material; * These prices were on a delivered basis.

Barrett Solvents are carefully refined to eliminate resinous or gummy bodies. They are simple in chemical formula, and have close boiling ranges and maximum solvent strength. They are not only valuable in producing top quality products, but in many applications they materially decrease processing time.

Their range covers the field of initial boiling points, distillation requirements and evaporation rates commonly used in industry. We will gladly cooperate with you in matching the correct solvent to your processes, or in developing special solvents to meet particular needs. Phone, wire or write for complete information.

BENZOL
TOLUOL
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THE BARRETT COMPANY
40 Rector Street, New York, N. Y.

America's leading manufacturer of coal-tar products.

ROOFINGS TARVIA CHEMICALS

Dimethyl Phthalate
Glauber's Salt

Prices

		Current Market	1939 Low	1939 High	1938 Low	1938 High
Dimethyl phthalate, drs, wks, frt allowed	lb.	...	.19	...	.19	...	.19
Dimethylsulfate, 100 lb drs	lb.	.45	.50	.45	.50	.45	.50
Dinitrobenzene, 400 lb bbls	lb. *k*	.18	.19	.16	.19	.16	.19
Dinitrochlorobenzene, 400 lb bbls	lb.	...	.14	.13½	.14	.13½	.14
Dinitronaphthalene, 350 lb bbls	lb.	.35	.38	.35	.38	.35	.38
Dinitrophenol, 350 lb bbls	lb.	.22	.23	.22	.24	.23	.24
Dinitrotoluene, 300 lb bbls	lb.	...	.15½	...	.15½	...	.15½
Diphenyl, bbls	lb.	.15	.25	.15	.25	.15	.25
Diphenylamine	lb.	.31	.32	.32	.32	.31	.32
Diphenylguanidine, 100 lb drs	lb.	.35	.37	.31	.37	.31	.32
Dip Oil, see Tar Acid Oil.							
Divi Divi pods, bgs shipmt	ton	...	nom.	...	nom.	...	nom.
Extract	lb.	.05¾	.06¾	.05¾	.06¾	.05	.06¾
E							
Egg Yolk, dom., 200 lb cases	lb.	.62	.64	.59	.69	.60	.69
Epsom Salt, tech, 300 lb bbls c-l, NY	100 lb.	1.90	2.10	1.90	2.10	1.90	2.10
USP, c-l, bbls	100 lb.	...	2.10	...	2.10	...	2.10
Ether, USP anaesthesia 55 lb drs	lb.	.22	.23	.22	.23	.22	.23
(Conc)	lb.	.09	.10	.09	.10	.09	.10
Isopropyl 50 gal drs	lb.	.07	.08	.07	.08	.07	.08
tks, frt allowed	lb.	...	.06	...	.06	...	.06
Nitrous conc bottles	lb.	...	.68	...	.68	...	.68
Synthetic, wks, drs	lb.	.08	.09	.08	.09	.08	.09
Ethyl Acetate, 85% Ester tks, frt all'd	lb.	...	.061	.051	.061	.051	.051½
drs, frt all'd	lb.	...	.071	.061	.071	.061	.061½
99%, tks, frt all'd	lb.	...	.0685	.0585	.0685	.0585	.063¼
drs, frt all'd	lb.	...	.0785	.0685	.0785	.0685	.073¼
Acetoacetate, 110 gal drs	lb.	...	.27½	...	.27½	...	.27½
Benzylaniline, 300 lb drs	lb.	.86	.88	.86	.88	.86	.88
Bromide, tech, drs	lb.	.50	.55	.50	.55	.50	.55
Cellullose, drs, wks, frt all'd	lb.	.45	.50	.45	.50	.45	1.00
Chloride, 200 lb drs	lb.	.22	.24	.22	.24	.22	.24
Chlorocarbonate, cbys	lb.	...	.30	...	.30	...	.30
Crotonate, drs	lb.	...	.35	.35	.75	1.00	1.25
Formate, drs, frt all'd	lb.	.27	.28	.27	.28	.27	.28
Lactate, drs, wks	lb.	...	.33	...	.33	...	.33
Oxalate, drs, wks	lb.	.30	.34	.30	.34	.30	.34
Oxybutyrate, 50 gal drs, wks	lb.	.30	.30½	.30	.30½	.30	.30½
Silicate, drs, wks	lb.	...	.77	...	.77	...	.77
Ethylene Dibromide, 60 lb drs	lb.	.65	.70	.65	.70	.65	.70
Chlorhydrin, 40%, 10 gal cbys chloro, cont	lb.	.75	.85	.75	.85	.75	.85
Anhydrous	lb.	...	.75	...	.75	...	.75
Dichloride, 50 gal drs, wks	lb.	.0545	.0994	.0545	.0994	.0545	.0994
Glycol, 50 gal drs, wks	lb.	.16	.20	.16	.21	.17	.21
tks, wks	lb.	...	.15	.15	.16	...	.16
Mono Butyl Ether, drs, wks	lb.	.18	.22	.18	.22	.20	.21
tks, wks	lb.	...	.17	.17	.19	...	.19
Mono Ethyl Ether, drs, wks	lb.	.15	.16	.15	.17	.16	.17
tks, wks	lb.	...	.14	...	.15	...	.15
Mono Ethyl Ether Acetate, drs, wks	lb.	.13	.14	.13	.14	...	.14
tks, wks	lb.	...	.12	.12	.13	...	.13
Mono Methyl Ether, drs wks	lb.	.17	.18	.17	.22	.18	.22
tks, wks	lb.	...	.16	...	.17	...	.17
Oxide, cyl	lb.	.50	.55	.50	.55	.50	.55
Ethylideneaniline	lb.	.45	.47½	.45	.47½	.45	.47½
F							
Feldspar, blk pottery	ton	17.00	19.00	17.00	19.00	17.00	19.00
Powd, blk, wks	ton	14.00	14.50	14.00	14.50	14.00	14.50
Ferric Chloride, tech, crys, 475 lb bbls	lb.	.05	.07½	.05	.07½	.05	.07½
sol, 42° cbys	lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
Fish Scrap, dried, unground wks	unit *l*	...	4.25	3.00	4.25	2.75	3.30
Acid, Bulk, 6 & 3%, delv Norfolk & Baltimore basis	unit *m*	...	3.00	2.35	3.00	2.50	2.50
Fluorspar, 98% bgs	lb.	...	31.60	30.00	33.00	...	33.00
Formaldehyde, USP, 400 lb bbls, wks	lb.	.05¾	.06¼	.05¾	.06¼	.05¾	.06¼
Fossil Flour	lb.	.02½	.04	.02½	.04	.02½	.04
Fullers Earth, blk, mines	ton	10.00	11.00	10.00	11.00	10.00	11.00
Imp powd, c-l, bgs	ton	23.00	30.00	23.00	30.00	23.00	30.00
Furfural (tech) drs, wks	lb.	.10	.15	.10	.15	.10	.15
Furfuramide (tech) 100 lb. drs	lb.	...	.30	...	.30	...	.30
Fusel Oil, 10% impurities	lb.	.12½	.14	.12½	.14	.12½	.14
Fustic, crystals, 100 lb boxes	lb.	.22	.26	.22	.26	.22	.26
Liquid 50°, 600 lb bbls	lb.	.09½	.13	.09½	.13	.09½	.13
Solid, 50 lb boxes	lb.	.17½	.19½	.17½	.19½	.17½	.19½
G							
G Salt paste, 360 lb bbls	lb.	.45	.47	.45	.47	.45	.47
Gambier, com 200 lb bgs	lb.	...	...	.06¼	.07¼	.06¼	.07¼
Singapore cubes, 150 lb bgs	100 lb.	...	...	.08	.09½	.08½	.11
Gelatine, tech, 100 lb cs	lb.	.42	.43	.42	.50	.45	.50
Glauber's Salt, tech, c-l, bgs, wks*	100 lb.	.95	1.18	.95	1.18	.95	1.15
Anhydrous, see Sodium Sulfate							

l + 10; *m* + 50; * Bbls. are 20c higher.

		Current Market		1939 Low	1939 High	1938 Low	1938 High
Glue, bone, com grades, c-l bgs	lb.	.12½	.14½	.11½	.14½	.13	.16½
Better grades, c-l, bgs	lb.	.16	.18	.15	.18	.14½	.16½
Glycerin, CP, 550 lb drs	lb.	...	.12½	...	.12½	.12½	.16
Dynamite, 100 lb drs.	lb.	...	nom.	...	.09	.12¾	.16
Saponification, drs	lb.	.09	.10	.08½	.10	.08½	.11¼
Soap Lye, drs	lb.	.07¾	.07⅞	.07½	.07⅞	.07½	.10¼
Glyceryl Bori-Borate, bbls	lb.	...	.40	...	.40	...	.40
Monoricinoleate, bbls	lb.	...	.27	...	.27	...	.27
Monostearate, bbls	lb.	...	.30	...	.30	...	.30
Oleate, bbls	lb.	...	.22	...	.22	...	.22
Phthalate	lb.	...	.37	...	.37	...	.37
Glyceryl Stearate, bbls	lb.	...	.18	...	.18	...	.18
Glycol Bori-Borate, bbls.	lb.	...	.22	.22	.23	...	.26
Phthalate, drs	lb.	...	.38	.38	.40	...	.40
Stearate, drs	lb.	...	.24	.24	.27½	...	.27½
GUMS							
Gum Aloes, Barbadoes	lb.	.85	.90	.85	.90	.85	.90
Arabic, amber sorts	lb.	.24	nom.	.09	.24	.09	.12
White sorts, No. 1, bgs	lb.	.35	nom.	.23	.35	.23	.28
No. 2, bgs	lb.	.34	nom.	.21	.34	.21	.26
Powd, bbls	lb.	.27	nom.	.12½	.27	.12	.16
Asphaltum, Barbadoes (Manjak) 200 lb bgs, f.o.b., NY	lb.	.02½	.10½	.02½	.10½	.02½	.10½
California, f.o.b. NY, drs	ton	29.00	55.00	29.00	55.00	29.00	55.00
Egyptian, 200 lb cases, f.o.b. NY	lb.	.12	.15	.12	.15	.12	.15
Benzoin Sumatra, USP, 120 lb cases	lb.	.33	.34	.17	.34	.15	.25
Copal, Congo, 112 lb bgs, clean, opaque	lb.	.23½	nom.	.18¾	.23½	.18¾	.19¼
Dark amber	lb.	.09⅞	nom.	.07½	.09⅞	.07½	.08⅞
Light amber	lb.	.15⅜	nom.	.11¼	.15⅜	.11¼	.13¼
Copal, East India, 180 lb bgs							
Macassar pale bold	lb.	.15¼	nom.	.11⅜	.15¼	.11⅜	.13
Chips	lb.	.08½	nom.	.05⅜	.08½	...	.05⅜
Dust	lb.	.06⅝	nom.	.03¼	.07⅛	.03½	.04⅛
Nubs	lb.	.13⅜	nom.	.09½	.13¾	.09⅜	.10⅜
Singapore, Bold	lb.	.18¼	nom.	.14	.18¼	.14½	.15¼
Chips	lb.	.10¼	nom.	.05⅜	.10¼	.04¼	.05⅜
Dust	lb.	.06⅜	nom.	.03¼	.07⅛	.03¼	.04⅛
Nubs	lb.	.13	nom.	.09⅝	.14⅜	.10	.10⅜
Copal Manila, 180-190 lb baskets, Loba A	lb.	.13⅜	nom.	.10½	.13⅜	.10½	.12
Loba B	lb.	.13	nom.	.09¾	.13	.10¼	.11⅝
Loba C	lb.	.12⅝	nom.	.09	.12⅝	.09¾	.11¼
DBB	lb.	.11	nom.	.07⅞	.11	.07⅞	.08¾
Dust	lb.	.07¾	nom.	.05⅛	.07¾	.05⅛	.06⅝
MA sorts	lb.	.09⅝	nom.	.05⅞	.09⅝	.05⅞	.07¼
Copal Pontianak, 224 lb cases, bold genuine	lb.	.18½	nom.	.15¼	.18½	.15¼	.16½
Chips	lb.	.09⅝	nom.	.07⅛	.11½	.08¼	.10¼
Mixed	lb.	.16⅜	nom.	.13⅜	.16⅜	...	.14
Nubs	lb.	.13¾	nom.	.10½	.14⅜	.11⅜	.12⅞
Split	lb.	.16⅛	nom.	.12	.16⅛	.13½	.13⅞
Damar Batavia, 136 lb cases							
A	lb.	.22¾	nom.	.20	.23¾	.20	.25½
B	lb.	.21⅛	nom.	.18½	.21⅛	.18½	.24
C	lb.	.15⅝	nom.	.13½	.15⅝	.14⅞	.20⅜
D	lb.	.14¼	nom.	.12¼	.14¼	.13⅛	.17½
A/D	lb.	.15¼	nom.	.12¾	.15¼	.14½	.20⅜
A/E	lb.	.13¾	nom.	.11⅜	.13¾	.12¼	.17¼
E	lb.	.10	nom.	.07⅜	.10	.07⅜	.08½
F	lb.	.08¾	nom.	.07¼	.08¾	...	.07¼
Singapore, No. 1	lb.	.19½	nom.	.13¼	.19½	.15¼	.21⅛
No. 2	lb.	.15⅝	nom.	.10½	.16⅜	.10⅜	.15⅜
No. 3	lb.	.08⅜	nom.	.05¼	.09⅛	.05	.05¾
Chips	lb.	.12½	nom.	.09¼	.12½	.09¼	.13½
Dust	lb.	.08⅜	nom.	.05¼	.09⅛	.05	.05¾
Seeds	lb.	.10½	nom.	.07⅜	.10½	.07⅜	.09½
Elemi, cns, c-l,	lb.	.13	nom.	.08⅛	nom.	.08⅛	.09½
Ester	lb.	.06¼	.07	.06	.07	.06¼	.08½
Gamboge, pipe, cases	lb.	.75	.80	.55	.80	.60	.80
Powd, bbls	lb.	.80	.85	.60	.85	.65	.85
Ghatti, sol. bgs	lb.	.11	.15	.11	.15	.11	.15
Karaya, bbls, bxs, drs,	lb.	.14	.33	.14	.33	...	...
Kauri, NY							
Brown XXX, cases	lb.	.60	nom.	.60	.60½	.60	.60½
BX	lb.	.38	nom.	...	.38	...	.38
B1	lb.	.28	nom.	...	.28	...	.28
B2	lb.	.24	nom.	...	.24	...	.24
B3	lb.	.18½	nom.	...	.18½	...	.18½
Pale XXX	lb.	.61	nom.	...	.61	...	.61
No. 1	lb.	.41	nom.	...	.41	...	.41
No. 2	lb.	.24	nom.	...	.24	...	.24
No. 3	lb.	.17¾	nom.	...	.17¾	...	.17¾
Kino, tins	lb.	4.00	4.50	2.50	4.50	2.00	2.75
Mastic	lb.	.70	nom.	.55	.70	.55	.56
Sandarac, prime quality, 200 lb bgs & 300 lb cks.	lb.	.37	nom.	.15	.37	.19	.26
Senegal, picked bags	lb.	.30	nom.	.25	.30	.23	.27
Sorts	lb.	.13	nom.	.09¼	.13	.09¼	.12
Thus, bbls	280 lbs.	15.00	15.25	13.50	15.25	13.50	14.25
Tragacanth, No. 1, cases	lb.	2.50	nom.	2.25	2.50	2.40	3.00
No. 2	lb.	2.40	nom.	1.90	2.40	2.30	2.75
No. 3	lb.	2.25	nom.	1.60	2.25	1.90	2.70
Yacca, bgs	lb.	.08	nom.	.03½	.08	.03½	.04½
H							
Helium, cyl (200 cu. ft.)	cyl.	...	25.00	...	25.00	...	25.00
Hematine crystals, 400 lb bbls	lb.	.18	.34	.18	.34	.18	.34
Hemlock, 25%, 600 lb bbls. wks	lb.	.03⅛	.03⅜	.03	.03⅜	.03	.03¼
tks	lb.	...	.02¾	.02⅝	.02¾	.02⅝	.02¾

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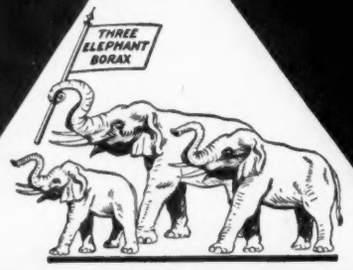

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Hexalene
Mangrove Bark

Prices

		Current Market	1939 Low	1939 High	1938 Low	1938 High
Hexalene, 50 gal drs, wks	lb.	...	.30	...	.30	...	.30
Hexane, normal 60-70° C. Group 3, tks	gal.	...	.10½	...	.10½	...	.10½
Hexamethylenetetramine, powd, drs	lb.	.32	.33	.32	.36	.35	.36
Hexyl Acetate, secondary, delv, drs	lb.	.13	.13½	.13	.13½	.13	.13½
tks	lb.	...	.12	...	.12	...	.12
Hoof Meal, f.o.b. Chicago unit		...	3.00	2.50	3.25	2.35	3.35
Hydrogen Peroxide, 100 vol, 140 lb cbys	lb.	.19½	.20	.19½	.20	.19½	.20
Hydroxylamine Hydrochloride	lb.	...	3.15	...	3.15	...	3.15
Hypernic, 51°, 600 lb bbls	lb.	.13	.16	.13	.21	.16	.21
I							
Indigo, Bengal, bbls	lb.	...	2.40	...	2.40	...	2.40
Synthetic, liquid	lb.	.16½	.19	.16½	.19	.16½	.19
Iodine, Resublimed, jars	lb.	...	2.00	1.75	2.00	1.50	1.75
Irish Moss, ord, bales	lb.	.10	.11	.10	.11	.10	.11
Bleached, prime, bales	lb.	.19	.20	.19	.20	.19	.20
Iron Acetate Liq. 17°, bbls delv	lb.	.03	.04	.03	.04	.03	.04
Chloride see Ferric Chloride.							
Nitrate, coml, bbls	100 lb.	2.32	3.11	2.32	3.11	2.32	3.11
Isobutyl Carbinol (128-132° C) drs, wks	lb.	.33	.34	.33	.34	.33	.34
tks, wks	lb.	...	.32	...	.32	...	.32
Isopropyl Acetate, tks, frt all'd	lb.	...	.06	.051	.06	.0510	.05½
drs, frt all'd	lb.	...	.07	.061	.07	.061	.07
Ether, see Ether, isopropyl.							
Keiselguhr, dom bags, c-l, Pacific Coast	ton	22.00	85.00	22.00	85.00	22.00	85.00
L							
Lead Acetate, f.o.b. NY, bbls, White, broken	lb.	...	.11	.10	.11	.10	.11
cryst, bbls	lb.	...	.11	.10	.11	.10	.11
gran, bbls	lb.	...	.11¾	.10¾	.11¾	.10¾	.11¾
powd, bbls	lb.	...	.11¾	.10¾	.11¾	.10¾	.11¾
Arsenate, East, drs	lb.	...	.11	.10	.11½	.11	.13½
Linoleate, solid, bbls	lb.	...	.19	...	.19	...	.19
Metal, c-l, NY	100 lb.	5.50	5.55	4.75	5.55	4.00	5.10
Nitrate, 500 lb bbls, wks	lb.	.11	.12	.10	.12	.10	.11½
Oleate, bbls	lb.	.18½	.20	.18½	.20	.18½	.20
Red, dry, 95% Pb_3O_4, delv	lb.	...	.081	.07¼	.08½	.06½	.08
97% Pb_3O_4, delv	lb.	...	.0835	.07½	.0835	.06¾	.081
98% Pb_3O_4, delv	lb.	...	.0860	.07¾	.0860	.07	.0835
Resinate, precip, bbls	lb.	...	.16½	...	.16½	...	.16½
Stearate, bbls	lb.	...	.25	.22	.25	.22	.23
Titanate, bbls, c-l, f.o.b. wks, frt all'd	lb.	.11	.11½	.11	.11½	.11	.11½
White, 500 lb bbls, wks	lb.	...	.07	...	.07	.06	.07
Basic sulfate, 500 lb bbls, wks	lb.	...	.06¼	...	.06¼	.05¼	.06¼
Lime, chemical quicklime, f.o.b., wks, bulk	ton	7.00	8.00	7.00	8.00	7.00	8.00
Hydrated, f.o.b. wks	ton	8.50	12.00	8.50	12.00	8.50	12.00
Lime Salts, see Calcium Salts							
Lime sulfur, dealers, tks	gal.	.08	.11½	.08	.11½	.08	.11½
drs	gal.	.11	.16	.11	.16	.11	.16
Linseed Meal, bgs	ton	...	34.00	34.00	42.00	39.00	45.00
Litharge, coml, delv, bbls	lb.	...	.0685	.06¼	.0685	.05½	.066
Lithopone, dom, ordinary, delv, bgs	lb.	...	.03¾	.03¾	.04⅛	.04⅛	.04⅝
bbls	lb.	...	.04	.04	.04⅛	.04⅛	.04⅞
High strength, bgs	lb.	...	.05¼	.05¼	.05⅝	.05⅝	.06⅛
bbls	lb.	...	.05½	.05½	.05⅞	.05⅞	.06⅜
Titanated, bgs	lb.	...	.05¼	.05¼	.05⅝	.05⅝	.06⅛
bbls	lb.	...	.05½	.05½	.05⅞	.05⅞	.06⅜
Logwood, 51°, 600 lb bbls	lb.	.09½	.11½	.09½	.11½	.09½	.11½
Solid, 50 lb boxes	lb.	.15	.19	.15	.19	.15	.19
Sticks	ton	24.00	25.00	24.00	25.00	24.00	25.00
M							
Madder, Dutch	lb.	.22	.25	.22	.25	.22	.25
Magnesite, calc, 500 lb bbls	ton	60.00	65.00	60.00	65.00	60.00	65.00
Magnesium Carb, tech, 70 lb bgs, wks	lb.	...	.06¼	.05¾	.06½	.05¾	.07
Chloride flake, 375 lb drs, c-l, wks	ton	39.00	42.00	39.00	42.00	39.00	42.00
Fluosilicate, crys, 400 lb bbls, wks	lb.	.10	.10½	.10	.10½	.10	.10½
Oxide, calc tech, heavy bbls, frt all'd	lb.	.25	.30	.25	.30	.25½	.30½
Light, bbls above basis	lb.	.20	.25	.20	.25	.20	.25½
USP Heavy, bbls, above basis	lb.	.25	.30	.25	.30	.25	.30½
Palmitate, bbls	lb.	.33	nom.	.33	nom.	...	.33
Silicofluoride, bbls	lb.	.11	.11½	.09½	.11½	.09½	.10½
Stearate, bbls	lb.	.21	.24	.21	.24	.21	.24
Manganese acetate, drs	lb.	...	.26½	...	.26½	...	.26½
Borate, 30%, 200 lb bbls	lb.	.15	.16	.15	.16	.15	.16
Chloride, 600 lb cks	lb.	.08¼	.08¾	.07½	.12	.09	.12
Dioxide, tech (peroxide), paper bags, c-l	ton	...	57.50	47.50	57.50	47.50	62.50
Hydrate, bbls	lb.	...	.32	...	.32	...	.32
Linoleate, liq, drs	lb.	.18	.19¼	.18	.19¼	.18	.19¼
solid, precip, bbls	lb.	...	.19	...	.19	...	.19
Resinate, fused, bbls	lb.	.08¼	.08½	.08¼	.08½	.08¼	.08½
precip, drs	lb.	...	.12	...	.12	...	.12
Sulfate, tech, anhyd, 90-95%, 550 lb drs	lb.	.08	.08½	.07	.08½	.07	.07½
Mangrove, 55%, 400 lb bbls	lb.	...	...	...	.04	...	.04
Bark, African	ton	...	...	23.00	26.00	23.00	24.50

		Current Market	1939 Low	1939 High	1938 Low	1938 High
Mannitol, pure cryst, cs,wks	lb.	.95	1.00	.95	1.20	1.15	1.45
commercial grd, 250 lb bbl	lb.	.42	.50	.42	.57	...	...
Marble Flour, blk	ton	12.00	14.00	12.00	14.00	12.00	13.00
Mercury chloride(Calomel)	lb.	...	2.57	1.36	2.57	1.18	1.59
Mercury metal...76 lb. flask		140.00	142.00	95.00	170.00	73.00	84.50
Mesityl Oxide, f.o.b. dest., tks.	lb.	...	.10½	.10½	.20	...	...
drs, c.l.	lb.	...	.11½	.11½	.21	...	...
drs, l.c.l.	lb.	...	.12	.12	.21½	...	...
Meta-nitro-aniline	lb.	.67	.69	.67	.69	.67	.69
Meta-nitro-paratoluidine 200 lb bbls	lb.	1.30	1.40	1.30	1.55	1.45	1.55
Meta-phenylene diamine 300 lb bbls	lb.	.80	.84	.80	.84	.80	.84
Meta-toluene-diamine 300 lb bbls	lb.	.65	.67	.65	.67	.65	.67
Methanol, denat, grd, drs, c-l, frt all'd	gal.	...	.46	.41	.46	.30	.41
tks, frt all'd	gal.	...	.40	.35	.40	.25	.35
Pure, drs, c-l, frt all'd	gal.	...	.38	...	.38	...	.38
tks	gal.	...	.33	...	.33	...	.33
95%, tks	gal.	...	.31	...	.31	...	.31
97%, tks	gal.	...	.32	...	.32	...	.32
Methyl Acetate, tech, tks, delv	lb.	...	.06	.06	.06½	...	.06½
55 gal drs, delv	lb.	.07	.08	.07	.08	.07½	.08
C.P. 97-99%, tks, delv	lb.	...	.06¼	...	.06¼	.06¼	.07
55 gal drs, delv	lb.	.07¼	.07¾	.07¼	.07¾	.07¼	.08½
Acetone, frt all'd, drs	gal. ℘	.41	.44	.30	.44	.30	.40½
tks, frt all'd, drs	gal. ℘	...	.35	.25	.35	.25	.32½
Synthetic, frt all'd, east of Rocky M., drs	gal. ℘	.38	.41	.38	.41	.38	.51
tks, frt all'd	gal.	...	.31½	...	.31½	.31½	.39½
West of Rocky M., frt all'd, drs	gal. ℘	...	.42	...	.42	.42	.46
tks, frt all'd	gal. ℘	...	.35	...	.35	.35	.39½
Anthraquinone	lb.	...	.83	...	.83	...	.83
Butyl Ketone, tks	lb.	...	.10½	...	.10½	...	.10½
Cellulose, 100 lb lots, frt allowed	lb.	...	.70	...	...	...	...
less than 100 lbs, f.o.b. wks	lb.	...	.75	...	...	...	...
Chloride, 90 lb cyl	lb.	.32	.40	.32	.40	.32	.40
Ethyl Ketone, tks, frt all'd	lb.	...	.05	...	.05	.05	.06
50 gal drs, frt all'd c-l	lb.	...	.06	...	.06	.06	.07
Formate, drs, frt all'd	lb.	.35	.36	.35	.36	.35	.36
Hexyl Ketone, pure, drs	lb.	...	.60	...	.60	...	.60
Lactate, drs, frt all'd	lb.	...	.30	...	.30	...	.30
Mica, dry grd, bgs, wks	lb.	...	30.00	...	30.00	30.00	35.00
Michler's Ketone, kgs	lb.	...	2.50	...	2.50	...	2.50
Monoamylamine, c-l,drs,wks	lb.	...	.52	...	.52	.52	1.00
l.c.l. drs, wks	lb.	...	.55	...	...	...	...
tks, wks	lb.	...	.50	...	...	...	...
Monobutylamine, drs, c.l., wks	lb.	...	.50	.50	.65	...	.65
l.c.l., wks	lb.	...	.53	...	...	...	...
tks, wks	lb.	...	.48	...	...	...	...
Monochlorobenzene, see "C"							
Monoethanolamine, tks, wks	lb.	...	.23	...	.23	...	.23
Monoethylamine (100% basis) lcl, drs, f.o.b. wks	lb.	...	.65	...	...	...	...
Monomethylamine, drs, frt all'd, E. Mississippi, c-l	lb.	...	.65	...	.65	...	.65
Monomethylparaminosulfate, 100 lb drs	lb.	3.75	4.00	3.75	4.00	3.75	4.00
Morpholine, drs 55 gal, lcl wks	lb.	...	.75	...	...	...	...
Myrobalans 25%, liq bbls	lb.	...	...	.03¾	.04¼	.03¾	.04¼
50% Solid, 50 lb boxes	lb.	...	...	.04¼	.05	.04⅜	.06¼
J1 bgs	ton	30.00	nom.	24.00	30.00	23.50	30.00
J2 bgs	ton	23.00	nom.	19.00	23.00	17.00	22.00
N							
Naphtha, v.m.&p. (deodorized) see petroleum solvents.							
Naphtha, Solvent, water-white, tks	gal.	...	.26	...	.26	.26	.31
drs, c-l	gal.	...	.31	...	.31	.31	.36
Naphthalene, dom, crude bgs, wks	lb.	2.50	2.60	2.25	2.85	2.25	2.85
Imported, cif, bgs	lb.	...	...	1.50	1.85	1.40	2.25
Balls, flakes, pks	lb.	...	.07½	.06½	.07½	.06½	.08
Balls, ref'd, bbls, wks	lb.	...	.06¾	.05¾	.06¾	.05¾	.07¼
Flakes, ref'd, bbls, wks	lb.	...	.06¾	.05¾	.06¾	.05¾	.07¼
Nickel Carbonate, bbls	lb.	.36	.37½	.36	.37½	.36	.37½
Chloride, bbls	lb.	.18	.20	.18	.20	.18	.20
Metal ingot	lb.	...	.35	...	.35	...	.35
Oxide, 100 lb kgs, NY	lb.	.35	.37	.35	.37	.35	.37
Salt, 400 lb bbls, NY	lb.	.13	.13½	.13	.13½	.13	.13½
Single, 400 lb bbls, NY	lb.	.13	.13½	.13	.13½	.13	.13½
Nicotine, 40%, drs, sulfate, 55 lb drs	lb.	...	.70	.70	.76	...	.76
Nitre Cake, blk	ton	...	16.00	...	16.00	...	16.00
Nitrobenzene, redistilled, 1000 lb drs, wks	lb.	.08	.10	.08	.10	.08	.10
tks	lb.		.07	.07	.07½	...	.07½
Nitrocellulose, c-l, l-c-l, wks	lb.	.22	.29	.22	.29	.22	.29
Nitrogen Sol. 45½% ammon., f.o.b. Atlantic & Gulf ports, tks, unit ton, N basis		...	1.2158	...	...	...	...
Nitrogenous Mat'l, bgs, imp	unit	...	...	2.25	2.50	2.35	2.65
dom, Eastern wks	unit	...	3.00	2.30	3.00	2.50	2.75
dom, Western wks	unit	...	2.25	1.90	2.25	2.20	2.35
Nitronaphthalene, 550 lb bbls	lb.	.24	.25	.24	.25	.24	.25
Nutgalls Alleppo, bgs	lb.	...	.23	.22	.23	.23	.23

℘ Country is divided in 4 zones, prices varying by zone; ℘ Country is divided into 4 zones. Also see footnote directly above; *q* Naphthalene quoted on Pacific Coast F.A.S. Phila., or N. Y.

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9462

Oak Bark Extract
Phenylhydrazine Hydrochloride

Prices

	Current Market	1939 Low	1939 High	1938 Low	1938 High
Oak Bark Extract, 25%, bbls lb.	.03⅛	.03⅛	.03½	...	.03⅛
tks lb.	...	.02¾	...	.02¾	.02¾
Octyl Acetate, tks, wks lb.	...	.15	.15	.17	.16	.17
Orange-Mineral, 1100 lb cks NY lb.	...	.10¾	.10¼	.10¾	.09½	.10½
Orthoaminophenol, 50 lb kgs lb.	2.15	2.25	2.15	2.25	2.15	2.25
Orthoanisidine, 100 lb drs lb.	.70	.74	.70	.74	.70	.74
Orthochlorophenol, drs lb.	...	.32	...	.32	.32	.75
Orthocresol, 30.4°, drs, wks lb.	.14½	.15	.14½	.17½	.13½	.17½
Orthodichlorobenzene, 1000 lb drs lb.	.06	.07	.06	.07	.06	.07
Orthonitrochlorobenzene, 1200 lb drs, wks lb.	.15	.18	.15	.18	.15	.18
Orthonitroparachlorphenol, tins lb.	...	.75	...	.75	...	.75
Orthonitrophenol, 350 lb drs lb.	.85	.90	.85	.90	.85	.90
Orthonitrotoluene, 1000 lb drs, wks lb.	...	.09	.08	.10	.08	.10
Orthotoluidine, 350 lb bbls, l-c-l lb.	...	.19	.16	.19	16	.17
Osage Orange, cryst, bbls lb.	.19	.25	.17	.25	.17	.25
51° liquid lb.	...	.09	.07	.09	.07	.08
P						
Paraffin, rfd, 200 lb bgs 122-127° M P lb.	.04¼	.04½	.03¾	.04½	.03¾	.04½
128-132° M P lb.	.04	.0485	.04	.0485	.04	.049
133-137° M P lb.	.0515	.0540	.0465	.0540	.0465	.05¾
Para aldehyde, 99%, tech, 110-55 gal drs, wks lb.	.10	.11¼	.10	.16*	.16*	.18*
Aminoacetanilid, 100 lb kgs lb.	...	.85	...	.85	...	.85
Aminohydrochloride, 100 lb kgs lb.	1.25	1.30	1.25	1.30	1.25	1.30
Aminophenol, 100 lb kgs lb.	...	1.05	...	1.05	...	1.05
Chlorophenol, drs lb.	.30	.45	.30	.45	.30	.45
Dichlorobenzene, 200 lb drs, wks lb.	.11	.12	.11	.12	.11	.12
Formaldehyde, drs, wks lb.	.34	.35	.34	.35	.34	.35
Nitroacetanilid, 300 lb bbls lb.	.45	.52	.45	.52	.45	.52
Nitroaniline, 300 lb bbls, wks lb.	.45	.47	.45	.47	.45	.47
Nitrochlorobenzene, 1200 lb drs, wks lb.	.15	.16	.15	.16	.15	.16
Nitro-orthotoluidine, 300 lb bbls lb.	2.75	2.85	2.75	2.85	2.75	2.85
Nitrophenol, 185 lb bbls lb.	.35	.37	.35	.37	.35	.37
Nitrosodimethylaniline, 120 lb bbls lb.	.92	.94	.92	.94	.92	.94
Nitrotoluene, 350 lb bbls lb.	...	.30	.30	.35	...	.35
Phenylenediamine, 350 lb bbls lb.	1.25	1.30	1.25	1.30	1.25	1.30
Toluenesulfonamide, 175 lb bbls. lb.	.70	.75	.70	.75	.70	.75
tks, wks lb.	...	.31	...	.31	...	.31
Toluenesulfonchloride, 410 lb bbls, wks lb.	.20	.22	.20	.22	.20	.22
Toluidine, 350 lb bbls, wks lb.	.48	.50	.48	.58	.56	.58
Paris Green, dealers, drs lb.	.23	.26	.23	.26	.23	.26½
Pentane, normal, 28-38° C, group 3, tks gal.	...	.08½	...	.08½	...	.08½
drs, group 3 gal.	.11½	.16	.11½	.16	.11½	.16
Perchlorethylene, 100 lb drs, frt all'd lb.	.08	.08¾	.08	.10½	...	.10½
Petrolatum, dark amber, bbls lb.	.03	.04½	.02½	.04½	.02½	.03½
Light, bbls lb.	.03¼	.04½	.03½	.04½	.03¼	.03½
Medium, bbls lb.	.02⅞	.03½	.02⅞	.03½	.02⅞	.03⅛
Dark green, bbls lb.	.02½	.02¾	.02½	.02¾	.02½	.02¾
Red, bbls lb.	.02½	.03½	.02½	.03½	.02½	.03½
White, lily, bbls lb.	.06	.07½	.05¼	.07½	.05¼	.07⅛
White, snow, bbls lb.	.07	.08½	.06¼	.08½	.06¼	.08½
Petroleum Ether, 30-60°, group 3, tks gal.	...	.13½	.13	.13½	...	.13
drs, group 3 gal.	.14½	.25½	.14	.25½	.14	.17
PETROLEUM SOLVENTS AND DILUENTS						
Cleaners naphthas, group 3, tks, wks gal.	.06⅞	.07	.06⅜	.07	.06⅜	.07⅜
East Coast, tks, wks gal.	...	.10	...	.10	...	.10
Hydrogenated, naphthas, frt all'd East, tks gal.	...	.16	...	.16	...	.16
No. 2, tks gal.	...	.18	...	.18	...	.18
No. 3, tks gal.	...	.16	...	.16	...	.16
No. 4, tks gal.	...	.18	...	.18	...	.18
Lacquer diluents, tks, East Coast gal.		.09	.09	.12½	.12	.12½
Group 3, tks gal.	.07⅞	.08	.07⅜	.08	.07⅜	.08⅜
Naphtha, V.M.P., East, tks wks gal.	...	.09	.09	.10	.09½	.10
Group 3, tks, wks gal.	.06⅞	.07	.06⅜	.07	.06⅜	.07⅜
Petroleum thinner, 43-47, East, tks, wks gal.	...	.08½	.08½	.10	.08½	.10
Group 3, tks, wks gal.	.05⅞	.06	.05⅜	.06	.05¾	.06⅛
Rubber Solvents, stand grd. East, tks, wks gal.	...	.09	.09	.10	.09½	.10
Group 3 tks, wks gal.	.06⅞	.07	.06⅜	.07	.06⅜	.07⅜
Stoddard Solvent, East, tks, wks gal.	...	.08½	.08½	.10	.09½	.10
Group 3, tks, wks gal.	.06⅜	.06½	.05⅞	.06½	.05⅞	.06⅞
Phenol, 250-100 lb drs lb.	.13	.14¾	.13	.15½	.14½	.15½
tks, wks lb.	...	.12	.12	.13½	...	.13½
Phenyl-Alpha-Naphthylamine, 100 lb kgs lb.	...	1.35	...	1.35	...	1.35
Phenyl Chloride, drs lb.	...	.17	...	.17	...	.17
Phenylhydrazine Hydrochloride, com lb.	...	1.50	...	1.50	...	1.50

* These prices were on a delivered basis.

Current

		Current Market		1939 Low	1939 High	1938 Low	1938 High
Phloroglucinol, tech, tins	lb.	15.00	16.50	15.00	16.50	15.00	16.50
70% basis	ton	20.00	22.00	20.00	22.00	20.00	22.00
72% basis	ton						
75-74% basis	ton	...	1.85	...	1.85	...	1.85
75% basis	ton	...	2.35	...	2.35	...	2.35
Tennessee, 72% basis	ton	...	2.85	...	2.85	...	2.85
Phosphorus Oxychloride 175 lb cyl	lb.	...	3.85	...	3.85	...	3.85
Red, 110 lb cases	lb.	...	5.50	...	5.50	...	5.50
Sesquisulfide, 100 lb cs.	lb.	...	4.50	...	4.50	...	4.50
Trichloride, cyl	lb.	.16	.20	.16	.20	.16	.20
Yellow, 110 lb cs, wks	lb.	.40	.44	.40	.44	.40	.44
Phthalic Anhydride, 100 lb drs, wks	lb.	.38	.44	.38	.44	.38	.44
Pine Oil, 55 gal drs or bbls	lb.	.15	.18	.15	.18	.15	.18
Destructive dist	lb.	.24	.30	.24	.30	.24	.30
Steam dist wat wh bbls	gal.	...	.14½	...	.14½	...	.14½
tks	gal.						
Pitch Hardwood, wks	ton	46	.48	.46	.48	.46	.55
Coaltar, bbls, wks	ton	...	.59	...	.59	...	.59
Burgundy, dom, bbls, wks	lb.	...	.54	...	.54	...	.54
Imported	lb.	18.25	18.75	18.25	18.75	18.25	18.75
Petroleum, see Asphaltum in Gums' Section.		...	19.00	...	19.00	...	19.00
Pine, bbls	bbl.	.05½	.06½	.05½	.06½	.05½	.06½
Stearin, drs	lb.	.15	.16	.15	.16	.15	.16
Platinum, ref'd	oz.						
CP, tins	lb.	6.00	6.25	6.00	6.25	5.75	6.25
Phosphate Rock, f.o.b. mines		.03	.04½	.03	.04½	.03	.04½
Florida Pebble, 68% basis	ton	40.00	42.00	32.00	42.00	30.00	39.00
POTASH							
Potash, Caustic, wks, sol.	lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
flake	lb.	.07	.07⅛	.07	.07⅛	.07	.07⅛
Liquid, tks	lb.	...	.02⅞	...	.02⅞	...	.02⅞
Manure Salts, imported 30% basis, blk	unit	...	.58½	...	.58½	...	.58½
Potassium Abietate, bbls.	lb.	...	.09	...	.09	.08	.13
Acetate, tech, bbls, delv	lb.	...	.26	...	.26	.26	.28
Bicarbonate, USP, 320 lb bbls	lb.	...	.18	...	.18	...	.18
Bichromate Crystals, 725 lb cks*	lb.	.08¾	.09¼	.08¾	.09¼	.08¾	.09¼
Binoxalate, 300 lb bbls.	lb.	...	.23	...	.23	...	.23
Bisulfate, 100 lb kgs	lb.	.15½	.18	.15½	.18	.15½	.18
Carbonate, 80-85% calc 800 lb cks	lb.	.06½	.07	.06½	.07	.06½	.07
liquid, tks	lb.	...	.02⅞	...	.02⅞	...	.02⅞
drs, wks	lb.	.03	.03½	.03	.03½	.03	.03½
Chlorate crys, 112 lb kgs, wks	lb.	.09¼	.09½	.09¼	.09½	.09¼	.09½
gran, kgs	lb.	.12	.13	.12	.13	.12	.13
powd, kgs	lb.	.08½	.08¾	.08½	.08¾	.08½	.08¾
Chloride, crys, bbls	lb.	.04	.04¼	.04	.04¼	.04	.04¼
Chromate, kgs	lb.	.19	.28	.19	.28	.19	.28
Cyanide, 110 lb cases	lb.	.50	.55	.50	.55	.50	.57½
Iodide, 250 lb bbls	lb.	...	1.35	1.13	1.35	.93	1.13
Metabisulfite, 300 lb bbls	lb.	.18	nom.	.11	.18	.12	.15
Muriate, bgs, dom, blk	unit	...	.53½	...	.53½	...	.53½
Oxalate, bbls	lb.	.25	.26	.25	.26	.25	.26
Perchlorate, kgs, wks	lb.	.09	.10½	.09	.10½	.09	.11½
Permanganate, USP, crys, 500 & 1000 lb drs, wks	lb.	.18½	.19½	.18½	.19½	.18½	.19½
Prussiate, red, bbls	lb.	...	.45	.30½	.45	.30½	.37
Yellow, bbls	lb.	.15	.16	.14	.16	.15	.16
Sulfate, 90% basis, bgs	ton	...	36.25	36.25	38.00	...	38.00
Titanium Oxalate, 200 lb bbls	lb.	.35	.40	.35	.40	.35	.40
Pot & Mag Sulfate, 48% basis bgs	ton	...	24.75	24.75	25.75	...	25.75
Propane, group 3, tks	lb.	.03	.04⅛	.03	.04⅛	.03	.04⅛
Putty, coml, tubs	100 lb.	...	6.00	3.00	6.00	2.25	3.00
Linseed Oil, kgs	100 lb.	...	4.50	...	4.50	4.00	4.65
Pyrethrum, conc liq: 2.4% pyrethrins, drs, frt all'd	gal.	7.15	7.50	5.75	7.50	5.00	6.75
3.6% pyrethrins, drs, frt all'd	gal.	10.65	11.00	8.45	11.00	7.65	9.95
Flowers, coarse, Japan, bgs	lb.	.33	.36	.26	.36	.18	.28½
Fine powd, bbls	lb.	.35	.37	.27	.37	.19	.30
Pyridine, denat, 50 gal drs	gal.	...	1.63	...	1.63	1.53	1.63
Refined, drs	lb.	...	.50	...	.50	.45	.50
Pyrites, Spanish cif Atlantic ports, blk	unit	.12	.13	.12	.13	.12	.13
Pyrocatechin, CP, drs, tins	lb.	2.15	2.75	2.15	2.75	2.15	2.75
Q							
Quebracho, 35% liq tks	lb.	...	.03¼	.02⅞	.03⅜	.03	.03⅜
450 lb bbls, c-l	lb.	...	.03¾	.04	.04⅝	.03½	.04⅛
Solid, 63%, 100 lb bales cif	lb.	...	.04⅜	.04	.04⅜	...	.04
Clarified, 64%, bales	lb.	...	.04⅝	.04¼	.04⅝	...	.04¼
Quercitron, 51 deg liq, 450 lb bbls	lb	.07½	.08½	.07½	.08½	.06	.08½
Solid, drs	lb.	.10	.12	.10	.12	.10	.12
R							
R Salt, 250 lb bbls, wks	lb.	.52	.55	.52	.55	.52	.55
Resorcinol tech, cans	lb.	.75	.80	.75	.80	.75	.80
Rochelle Salt, cryst	lb.	.20¾	.21¼	.17¾	.21¼	.15	.18¼
Powd, bbls	lb.	.19¾	.20¼	.16¾	.20¼	.16	.18½
Rosin Oil, bbls, first run	gal.	.45	.47	.45	.47	.45	.60
Second run	gal.	.47	.49	.47	.49	.47	.62
Third run, drs	gal.	.51	.53	.51	.53	.51	.66

* Spot price is ½c higher.

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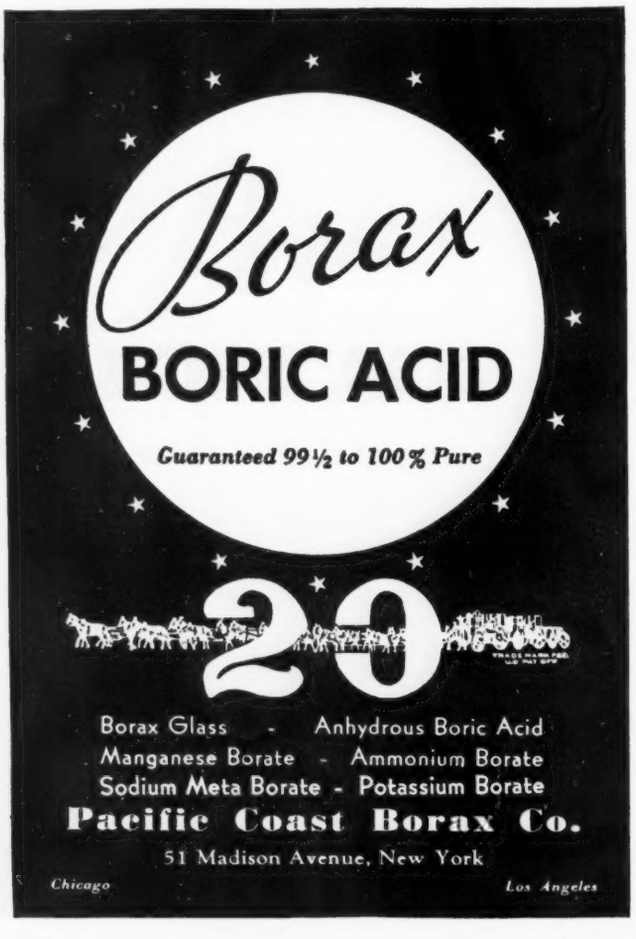

Rosins
Sodium Nitrate

Prices

	Current Market	1939 Low	1939 High	1938 Low	1938 High
Rosins 600 lb bbls, 280 lb unit ex. yard NY:***					
B	...	5.40	4.60	5.40	4.65	6.00
D	...	5.50	4.95	5.70	4.75	6.00
E	...	6.40	5.20	6.40	4.90	6.00
F	...	6.60	5.50	6.75	5.05	7.00
G	...	6.80	5.75	7.00	5.25	7.05
H	6.95	7.05	5.75	7.10	5.25	7.15
I	7.10	7.20	5.77½	7.20	5.25	7.15
K	7.10	7.20	5.80	7.20	5.25	7.25
M	7.05	7.25	5.90	7.25	5.25	7.40
N	...	7.30	6.75	7.40	6.20	7.50
WG	...	7.40	7.10	7.70	6.75	8.45
WW	...	7.75	7.45	8.50	7.55	9.15
Rosins, Gum, Savannah (280 lb unit):**						
B	...	4.00	3.25	4.00	3.25	4.60
D	...	4.10	3.55	4.30	3.50	4.60
E	...	5.00	3.80	5.00	3.55	4.60
F	...	5.20	4.00	5.35	3.90	5.60
G	...	5.40	4.40	5.70	4.20	5.75
H	...	5.55	4.40	5.70	4.20	5.75
I	5.75	5.80	4.40	5.80	4.20	5.85
K	5.75	5.80	4.40	5.80	4.20	6.00
M	...	5.80	4.40	5.85	4.20	6.15
N	...	5.85	5.10	6.00	4.80	6.20
WG	...	6.00	5.60	6.30	5.40	7.05
WW	...	6.35	5.60	7.10	6.10	7.75
X	...	6.35	6.05	7.10	6.10	7.75
Rosin, Wood, c-l, FF grade, NY	4.00	6.80	5.35	6.80	5.05	6.40
Rotten Stone, bgs mines..ton	25.50	37.50	22.50	37.50	22.50	35.00
Imported, lump, bbls..lb.	...	.14	...	.14	.12	.14
Powdered, bbls.....lb.	.08½	.10	.08½	.10	.08½	.10
S						
Sago Flour, 150 lb bgs...lb.	.04	.04½	.02½	.04½	.02½	.03¾
Sal Soda, bbls, wks ...100 lb.	...	1.20	...	1.20	...	1.20
Salt Cake, 94-96%, c-l, wks ton	19.00	25.00	19.00	25.00	19.00	23.00
Chrome, c-l, wks .....ton	11.00	12.00	11.00	12.00	11.00	12.00
Saltpetre, gran, 450-500 lb bbls .....lb.	.06½	.069	.06½	.069	.06½	.069
Cryst, bbls .....lb.	.07½	.0865	.07½	.0865	.07½	.0865
Powd, bbls .....lb.	.07½	.079	.07¼	.079	.07¼	.079
Satin, White, pulp, 550 lb bbls .....lb.	.01¼	.01¼	.01¼	.01½	.01¼	.01½
Schaeffer's Salt, kgs .....lb.	.46	.48	.46	.48	.46	.48
Shellac, Bone dry, bbls..lb. *r*	.24	nom.	.18	.24	.16½	.20
Garnet, bgs .....lb.	.16	nom.	.12½	.16	.12½	.15
Superfine, bgs .....lb. *s*	.17	nom.	.10	.17	.11	.13½
T. N., bgs .....lb. *s*	.16	nom.	.09½	.16	.10½	.12½
Silver Nitrate, vials .....oz.	...	.27	.26⅞	.33½	.33½	.34⅞
Slate Flour, bgs, wks...ton	9.00	10.00	9.00	10.00	9.00	10.00
Soda Ash, 58% dense, bgs, c-l, wks .....100 lb.	...	1.10	...	1.10	...	1.10
58% light, bgs .....100 lb.	...	1.08	...	1.08	...	1.08
blk .....100 lb.	...	.90	...	.90	...	.90
paper bgs .....100 lb.	...	1.05	...	1.05	...	1.05
bbls .....100 lb.	...	1.35	...	1.35	...	1.35
Caustic, 76% grnd & flake, drs .....100 lb.	...	2.70	...	2.70	...	2.70
76% solid, drs ....100 lb.	...	2.30	...	2.30	...	2.30
Liquid sellers, tks ..100 lb.	...	1.97½	...	1.97½	...	1.97½
Sodium Abietate, drs ....lb.	...	.11	...	.11	.10	.13
Acetate, 60% tech, gran, powd, flake, 450 lb bbls wks .....lb.	.04	.05	.04	.05	.04	.05
anhyd, drs, delv .....lb.	...	.08¼	...	.08¼	...	.08¼
Alginate, drs .....lb.	.71	.95	.70	.95	.69	.70
Antimoniate, bbls .....lb.	.15	nom.	.11½	.16	.12	.15¼
Arsenate, drs .....lb.	.08	.08½	.08	.08½	.08	.08½
Arsenite, liq, drs .....gal.	...	.35	.30	.35	.30	.33
Dry, gray, drs, wks..lb.	.07½	.09½	.07½	.09½	.07½	.09½
Benzoate, USP kgs ...lb.	.46	.48	.46	.48	.46	.48
Bicarb, powd, 400 lb bbl, wks .....100 lb.	...	1.85	...	1.85	...	1.85
Bichromate, 500 lb cks, wks* .....lb.	.06¾	.07¼	.06¾	.07¼	.06¾	.07¼
Bisulfite, 500 lb bbls, wks lb.	.033	.036	.03¼	.036	.03	.036
35-40% sol bbls, wks 100 lb.	1.40	1.80	1.40	1.80	1.40	1.80
Chlorate, bgs, wks .....lb.	.06¼	.07½	.06¼	.07½	.06¼	.07½
Cyanide, 96-98%, 100 & 250 lb drs, wks .....lb.	.14	.15	.14	.15	.14	.17½
Diacetate, 33-35% acid, bbls, lcl, delv .....lb.	...	.09	...	.09	...	.09
Fluoride, white 90%, 300 lb bbls, wks .....lb.	.07¼	.08¾	.07¼	.08¾	.07½	.08¼
Hydrosulfite, 200 lb bbls, f.o.b. wks .....lb.	.16	.17	.16	.17	.16	.17
Hyposulfite, tech, pea crys 375 lb bbls, wks 100 lb.	...	2.80	...	2.80	2.50	2.80
Tech, reg cryst, 375 lb bbls, wks .....100 lb.	2.45	2.80	2.45	2.80	2.40	2.80
Iodide, jars .....lb.	...	2.30	2.10	2.30	1.90	2.10
Metal, drs, 280 lbs ...lb.	...	.19	...	.19	...	.19
Metanilate, 150 lb bbls..lb.	.41	.42	.41	.42	.41	.42
Metasilicate, gran, c-l, wks .....100 lb.	...	2.20	...	2.20	2.15	2.20
cryst, drs, c-l, wks 100 lb.	...	2.90	...	2.90	2.75	2.90
Monohydrated, bbls ....lb.	...	.023	...	.023	...	.023
Naphthenate, drs .....lb.	.12	.19	.12	.19	.12	.19
Naphthionate, 300 lb bbl lb.	...	.50	.50	.54	.52	.54
Nitrate, 92%, crude, 200 lb bgs, c-l, NY .....ton	...	28.30	...	28.30	...	28.30
100 lb bgs .....ton	...	29.00	...	29.00	...	29.00
Bulk .....ton		27.00	...	27.00	...	27.00
Nitrite, 500 lb bbls ...lb.	.06¾	.11½	.06¾	.11½	.06¾	.11½

r Bone dry prices at Chicago 1c higher; Boston ½c; Pacific Coast 2c; Philadelphia deliveries f.o.b. N. Y.; refined 6c higher in each case: *s* T. N. and Superfine prices quoted f.o.b. N. Y. and Boston; Chicago prices 1c higher; Pacific Coast 3c; Philadelphia f.o.b. N. Y. * Spot price is ⅛c higher. ** Oct. 31. *** Oct. 31.

	Current Market	1939 Low	1939 High	1938 Low	1938 High
Sodium (continued):					
Orthochlorotoluene, sulfonate, 175 lb bbls, wks lb.	.25	.27	.25	.27	.25	.27
Orthosilicate, 300 lb drs, c.l. lb.	...	2.90	2.90	2.90	2.90	2.90
Perborate, drs, 400 lbs. lb.	.14¾	.15¼	.14¾	.15¼	.14¾	.15¼
Peroxide, bbls, 400 lb. lb.	...	.17	...	.17	...	.17
Phosphate, di-sodium, tech, 310 lb bbls, wks 100 lb.	...	2.30	2.05	2.30	...	2.05
bgs, wks 100 lb.	...	2.10	1.85	2.10	...	1.85
Tri-sodium, tech, 325 lb bbls, wks 100 lb.	...	2.45	2.20	2.45	...	2.20
bgs, wks 100 lb.	...	2.25	2.00	2.25	...	2.00
Picramate, 160 lb kgs. lb.	.65	.67	.65	.67	.65	.67
Prussiate, Yellow, 350 lb bbl, wks lb.	.10½	.10¾	.09½	.10¾	.09	.11½
Pyrophosphate, anhyd, 100 lb bbls f.o.b. wks frt eq lb.	...	.0530	...	.0530	.0530	.10
Sesquisilicate, drs, c-l, wks 100 lb.	...	2.80	...	2.80	2.80	3.00
Silicate, 60°, 55 gal drs, wks 100 lb.	1.65	1.70	1.65	1.70	1.65	1.70
40°,55 gal drs, wks 100 lb.	...	.80	...	.80	...	.80
tks, wks 100 lb.	...	.65	...	.65	...	.65
Silicofluoride, 450 lb bbls NY lb.	.04¼	nom.	.03½	.04¾	.04¾	.06½
Stannate, 100 lb drs lb.	...	.33½	.30	.35	.25½	.34
Stearate, bbls lb.	.19	.24	.19	.24	.19	.24
Sulfanilate, 400 lb bbls lb.	.16	.18	.16	.18	.16	.18
Sulfate Anhyd, 550 lb bgs* c-l, wks 100 lb. ‡	1.45	1.90	1.45	1.90	1.45	1.90
Sulfide, 80% cryst, 440 lb bbls, wks lb.	...	.02½	.02¼	.02½	...	.02¼
Solid, 650 lb drs, c-l, wks lb.	...	.03¼	.03	.03½	...	.03
Sulfite, cryst, 400 lb bbls, wks lb.	.023	.02½	.023	.02½	.023	.02½
Sulfocyanide, drs lb.	.28	.47	.28	.47	.28	.47
Sulforicinoleate, bbls. lb.	...	.12	...	.12	...	.12
Tungstate, tech, crys, kgs lb.	1.05	1.10	1.05	1.10	1.05	1.35
Sorbitol, com, solut, wks c-l, drs, wks lb.	...	.15½	...	.15½	.15½	.19
Spruce Extract, ord, tks. lb.	...	.01⅛	...	.01⅛	...	.01⅛
Ordinary, bbls lb.	...	.01⅝	...	.01⅝	...	.01⅝
Super spruce ext, tks lb.	...	.01⅜	...	.01⅜	...	.01⅜
Super spruce ext, bbls. lb.	...	.01⅞	...	.01⅞	...	.01⅞
Super spruce ext, powd, bgs lb.	...	.04	...	.04	...	.04
Starch, Pearl, 140 lb bgs 100 lb.	...	2.45	2.40	2.85	2.40	3.18
Powd, 140 lb bgs 100 lb.	...	2.55	2.50	2.90	2.50	3.28
Potato, 200 lb bgs lb.	.06	nom.	.04	.06	.03½	.05½
Imp, bgs lb.	.06	nom.	.05	.06	.05	.06
Rice, 200 lb bbls lb.	.07¼	nom.	.06¼	.07¼	.06¼	.07¼
Sweet Potato, 240 lb bbls, f.o.b. plant 100 lb.	7.25	7.50	7.25	7.50	...	...
Wheat, thick, bgs lb.	.05¼	nom.	.05	.05½	.06¼	.07
Strontium carbonate, 600 lb bbls, wks lb.	.24	nom.	.16	.24	.16½	.17
Nitrate, 600 lb bbls, NY lb.	.07¾	.08¼	.07¾	.08¼	.07¾	.09¼
Sucrose octa-acetate, den, grd, bbls, wks lb.	...	.45	...	.45	...	.45
tech, bbls, wks lb.	...	.40	...	.40	...	.40
Sulfur, crude, f.o.b. mines ton	...	16.00	...	16.00	16.00	19.00
Flour, coml, bgs 100 lb.	1.65	2.35	1.65	2.35	1.65	2.35
bbls 100 lb.	1.95	2.70	1.95	2.70	1.95	2.70
Rubbermakers, bgs. 100 lb.	2.20	2.80	2.20	2.80	2.20	2.80
bbls 100 lb.	2.55	3.15	2.55	3.15	2.55	3.15
Extra fine, bgs 100 lb.	2.85	3.00	2.85	3.00	2.85	3.00
Superfine, bgs 100 lb.	2.65	2.80	2.65	2.80	2.65	2.80
bbls 100 lb.	2.25	3.10	2.25	3.10	2.25	3.10
Flowers, bgs 100 lb.	3.00	3.75	3.00	3.75	3.00	3.75
bbls 100 lb.	3.35	4.10	3.35	4.10	3.35	4.10
Roll, bgs 100 lb.	2.35	3.10	2.35	3.10	2.35	3.10
bbls 100 lb.	2.50	3.25	2.50	3.25	2.50	3.25
Sulfur Chloride, 700 lb drs, wks lb.	.03	.04	.03	.04	.03	.04
Sulfur Dioxide, 150 lb cyl lb.	.07	.09	.07	.09	.07	.09
Multiple units, wks lb.	.04½	.07	.04½	.07	.04½	.07
tks, wks lb.	.04	.05	.04	.05	.04	.05
Refrigeration, cyl, wks lb.	.16	.17	.16	.17	.16	.17
Multiple units, wks lb.	.07½	.10	.07½	.10	.07½	.10
Sulfuryl Chloride lb.	.15	.40	.15	.40	.15	.40
Sumac, Italian, grd ton	83.00	nom.	65.50	83.00	62.00	68.00
Extract, 42°, bbls lb.	...	...	.05¼	.06¼	.05¼	.06¼
Superphosphate, 16% bulk, wks ton	...	8.00	...	8.00	8.00	9.00
Run of pile ton	...	7.50	...	7.50	7.50	8.50
Triple, 40-48%, a.p.a. bulk, wks, Balt. unit ton	...	.70	...	.70	.70	85
Talc, Crude, 100 lb bgs, NY ton	13.00	15.00	13.00	15.00	13.00	15.00
Ref'd, 100 lb bgs, NY ton	14.00	16.00	14.00	16.00	14.00	16.00
French, 220 lb bgs, NY ton	23.00	30.00	23.00	30.00	23.00	30.00
Ref'd, white, bgs, NY ton	45.00	60.00	45.00	60.00	45.00	60.00
Italian, 220 lb bgs to arr ton	60.00	62.00	60.00	62.00	60.00	62.00
Ref'd, white, bgs, NY ton	65.00	70.00	65.00	70.00	65.00	70.00
Tankage Grd, NY unit ‰	...	3.25	2.75	3.25	2.50	3.15
Ungrd unit ‰	...	3.75	2.75	5.00	2.35	3.00
Fert grade, f.o.b. Chgo unit ‰	...	3.25	2.50	4.50	2.25	3.00
South American cif unit ‰	...	4.00	3.00	4.00	3.00	3.45
Tapioca Flour, high grade, bgs lb.	.04½	nom.	.01¾	.05½	.02	.05½
Tar Acid Oil, 15%, drs. gal.	.21	.23	.21	.24	.21	.25½
25%, drs gal.	.25	.27	.25	.28	.25	.29½
Tar, pine, delv, drs gal.	.25	.26	.25	.26	...	.26
tks, delv, E. cities gal.	...	.20	...	.20	...	.20
Tartar Emetic, tech, bbls lb.	.34¾	.35	.27¾	.35	.26¾	.28
USP, bbls lb.	...	.40	.33	.40	.32	.33½
Terpineol, den grade, drs lb.	...	.17	...	.17	...	.17

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Tetrachlorethane
Zinc Acetate

Prices

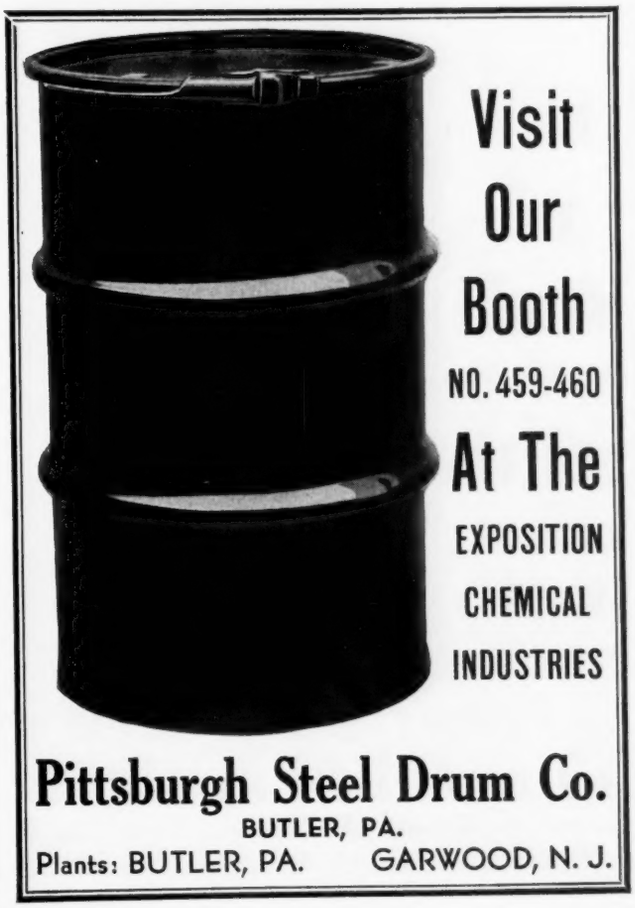
	Current Market	1939 Low	1939 High	1938 Low	1938 High
Tetrachlorethane, 650 lb drs lb.	.08	.08½	.08	.08½	.08	.08½
Tetrachloroethylene,drs,tech lb.	...	.09½	...	.09½	...	.09½
Tetralene, 50 gal drs, wks lb.	.12	.13	.12	.13	.12	.13
Thiocarbanilid, 170 lb bbls lb.	.20	.25	.20	.25	.20	.25
Tin, crystals, 500 lb bbls,wks lb.	no prices		.35½	.39	.31	.36½
Metal, NY lb.	...	.55	.4520	.60	.3570	.4675
Oxide, 300 lb bbls, wks lb.	no prices		.50	.54	.44	.50
Tetrachloride, 100 lb drs, wks lb.	...	.27	.23	.32	.18½	.23½
Titanium Dioxide, 300 lb bbls lb.	.13¼	.16	.13¼	.16	.14½	.17
Barium Pigment, bbls lb.	.05½	.06½	.05⅝	.06½	.05⅝	.06⅜
Calcium Pigment, bbls lb.	.05½	.06½	.05⅝	.06½	.05⅝	.06⅜
Toluidine, mixed, 900 lb drs, wks lb.	.26	.27	.26	.27	.26	.27
Toluol, 110 gal drs, wks gal.	...	.27	...	.27	.27	.35
8000 gal tks, frt all'd gal.	...	.22	...	.22	.22	.30
Toner Lithol, red, bbls lb.	.62	.67	.62	.80	.75	.80
Para, red, bbls lb.	.75	.80	.75	.80	.75	.80
Toluidine, bgs lb.	...	1.35	...	1.35	...	1.35
Triacetin, 50 gal drs, wks lb.	...	.36	...	.36	...	.36
Triamyl Borate, lcl, drs, wks lb.	...	.27	...	.27	...	.27
Triamylamine, c-l, drs, wks lb.	...	.77	.77	1.25	.77	1.25
lcl, wks, drs, lb.	...	.80	...	...	...	...
tks, wks, lb.	...	.75	...	...	...	...
Tributylamine, lcl, drs, wks lb.	...	.70	...	.70	...	.70
cl, drs, wks lb.	...	.67	...	...	...	...
tks, wks lb.	...	.65	...	...	...	...
Tributyl citrate, drs, frt all'd lb.	...	.45	...	.45	...	.45
Tributyl Phosphate, frt all'd lb.	...	.42	...	.42	.42	.50
Trichlorethylene, 600 lb drs, frt all'd E. Rocky Mts. lb.	.08	.08¾	.08	.09½	.089	.09½
Tricresyl phosphate, tech,drs lb.	.23	.37½	.23	.37½	.23	.39
Triethanolamine, 50 gal drs wks lb.	.21	.22	.21	.22	.21	.22
tks, wks lb.	...	.20	...	.20	...	.20
Triethylamine, lcl, drs, f.o.b. wks lb.	...	1.05	...	...	...	...
Triethylene glycol, drs, wks lb.	...	.26	...	.26	...	.26
Trihydroxyethylamine Oleate, bbls lb.	...	.30	...	.30	...	.30
Stearate, bbls lb.	...	.30	...	.30	...	.30
Trimethyl Phosphate, drs, lcl f.o.b. dest lb.	...	.50	...	.50	...	.50
Trimethylamine, c-l, drs, frt all'd E. Mississippi lb.	...	1.00	...	1.00	...	1.00
Triphenylguanidine lb.	.58	.60	.58	.60	.58	.60
Triphenyl Phosphate, drs lb.	...	.38	...	.38	.34	.38
Tripoli, airfloated, bgs, wks ton	26.00	30.00	26.00	30.00	26.00	30.00
Turpentine (Spirits), c-l, NY dock, bbls gal.	...	.33**	.29	.35*	.26½	.31½
Savannah, bbls gal.	...	.27*	.23½	.29*	.20½	.30¾
Jacksonville, bbls gal.	...	.26½*	.23½	.26¾	.20½	.30¾
Wood Steam dist, drs, c-l, NY gal.	.31½	.34	.242	.34	.242	.31
Wood, dest dist, c-l, drs, delv E. cities gal.	.23	.25	.22	.25	.22	.36
U						
Urea, pure, 112 lb cases lb.	.14½	.15½	.14½	.15½	.14½	.15½
Fert grade, bgs, c.i.f. ton						
c.i.f. S.A. points ton	95.00	110.00	95.00	110.00	95.00	110.00
Dom. f.o.b., wks ton	95.00	101.00	95.00	101.00	95.00	101.00
Urea Ammonia, liq., nitrogen basis ton	...	121.58	...	...	...	...
V						
Valonia beard, 42%, tannin bgs ton	54.00	nom.	45.00	57.00	45.00	52.00
Cups, 32% tannin, bgs ton	33.00	37.00	27.00	39.00	30.00	37.50
Extract, powd, 63% lb.	.05	.06	.05	.06	...	.06
Vanillin, ex eugenol, 25 lb tins, 2000 lb lots lb.	...	2.60	2.20	2.60	2.10	3.10
Ex-guaiacol lb.	...	2.50	2.10	2.50	2.00	3.00
Ex-lignin lb.	...	2.50	2.10	2.50	2.00	2.25
Vermilion, English, kgs lb.	2.70	2.79	1.50	2.97	1.45	1.69
W						
Wattle Bark, bgs ton	34.50	40.00	34.50	40.00	36.00	41.75
Extract, 60°, tks, bbls lb.	...	.04¼	.04	.05½	.04⅜	.04⅝
WAXES						
Wax, Bayberry, bgs lb.	.38	.39	.16⅞	.39	.16⅞	.17
Bees, bleached, white 500 lb slabs, cases lb.	.38	.40½	.33	.40½	.35	.45
Yellow, African, bgs lb.	.30	nom.	.18½	.30	.19	.26
Brazilian, bgs lb.	.33	nom.	.21	.33	.22	.29
Chilean, bgs lb.	.33	nom.	.21	.33	.22	.29
Refined, 500 lb slabs, cases lb	.31	.36	.25½	.36	.32	.39
Candelilla, bgs lb.	.18	.19	.15¼	.19	.13½	.16
Carnauba, No. 1, yellow, bgs lb.	no prices		.36¾	.46½	.38	.44
No. 2, yellow, bgs lb.	no prices		.35¾	.45	.36	.42
No. 2, N. C., bgs lb.	no prices		.34	.41	.34	.40
No. 3, Chalky, bgs lb.	.43	nom.	.27½	.43	.29	.35½
No. 3, N. C., bgs lb.	.44	.45	.28¾	.45	.30	.35½
Ceresin, dom, bgs lb.	.09	.12½	.08½	.12½	.08½	.11½
Japan, 224 lb cases lb.	.17½	nom.	.09¾	.17½	.09¼	.11
Montan, crude, bgs lb.	no prices		.11	.11¾	.11	.12⅛
Paraffin, see Paraffin Wax.						
Spermaceti, blocks, cases lb.	.24	.25	.18	.25	.22	.24
Cakes, cases lb.	.25	.26	.19	.26	.23	.25
Whiting, chalk, com 200 lb bgs c-l, wks ton	12.00	14.00	12.00	14.00	12.00	14.00
Gilders, bgs, c-l, wks ton	...	15.00	...	15.00	...	15.00
Wood Flour, c-l, bgs ton	20.00	30.00	20.00	30.00	20.00	33.00
Xylol, frt all'd, East 10* tks, wks gal.	...	.29	...	.29	.29	.33
Coml, tks, wks, frt all'd, gal.	...	.26	...	.26	.26	.30
Xylidine, mixed crude, drs lb.	.35	.36	.35	.36	.35	.36
Zein, bgs, 1,000 lb lots, wks lb.	...	.20	...	...	...	...
Zinc Acetate, tech, bbls, lcl, delv lb.	.15	.16	.15	.21	...	.21

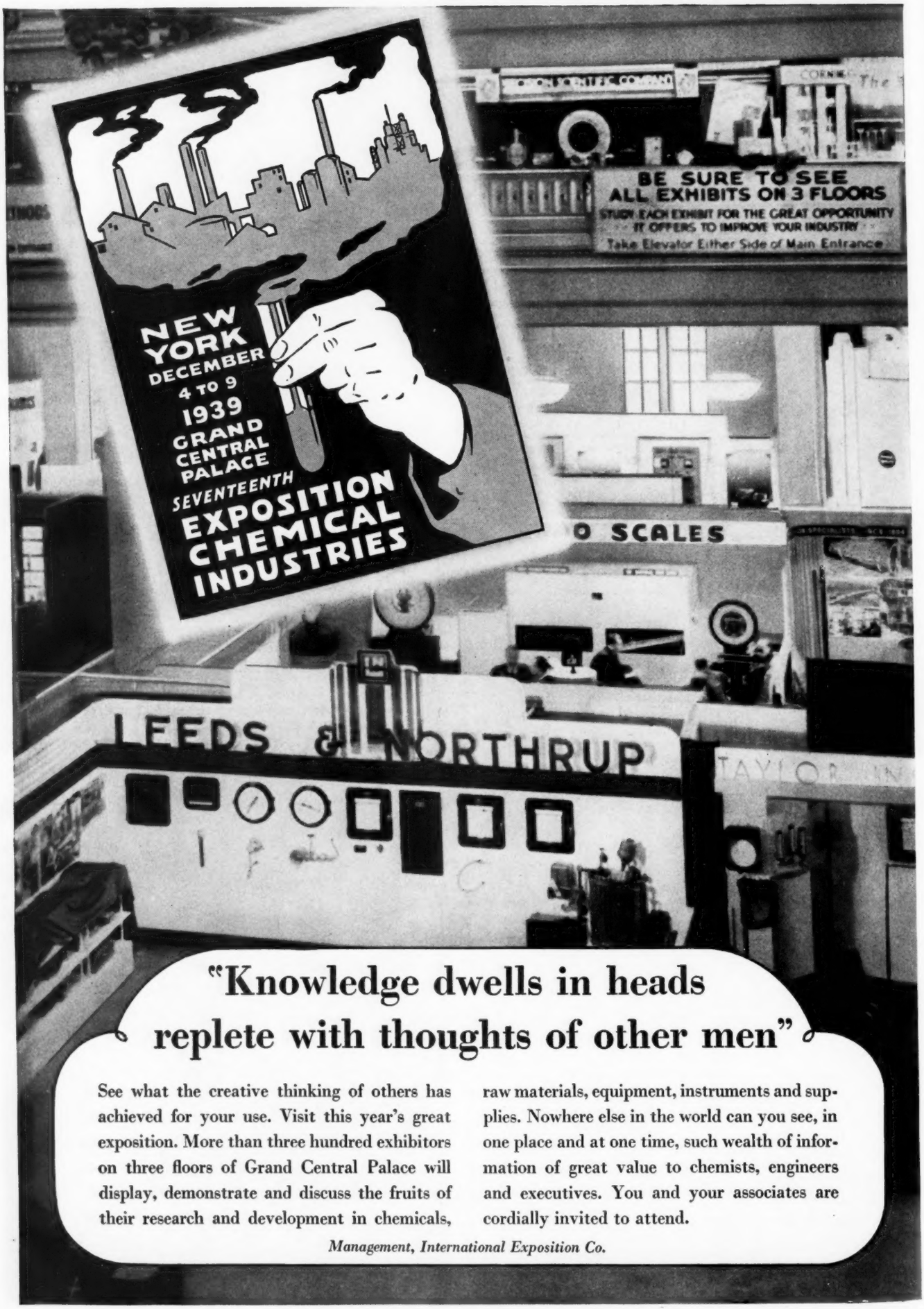
* Oct. 31. **Oct. 31.

		Current Market	1939 Low	1939 High	1938 Low	1938 High
Zinc (continued):						
Arsenite, bgs, frt all'd	lb.	.12	.12½	.13	.12½	.13
Carbonate tech, bbls, NY	lb.	.14	.15	.14	.15	.14 .15
Chloride fused, 600 lb drs, wks	lb.	.04¼	.046	.04¼	.046	.04¼ .046
Gran, 500 lb drs, wks	lb.	.05	.05¾	.05	.05¾	.05 .05¾
Soln 50%, tks, wks 100 lb		...	2.25	...	2.25	... 2.25
Cyanide, 100 lb drs	lb.	...	.33	...	.33	.33 .38
Dust, 500 lb bbls, c-l, delv	lb.	...	.08½	.06½	.08½	.06 .0740
Metal, high grade slabs, c-l, NY	100 lb.	...	5.50	4.84	5.50	4.35 5.45
E. St. Louis	100 lb.	...	5.35	4.60	5.35	4.00 5.05
Oxide, Amer, bgs, wks	lb.	.06¼	.07½	.06¼	.07½	.06 .07½
French 300 lb bbls, wks	lb.	.06½	.07¾	.06½	.07¾	.06¼ .07¾
Palmitate, bbls	lb.	.23	.25	.23	.25	.23 .25
Resinate, fused, pale bbls	lb.	...	.10	...	.10	... .10
Stearate, 50 lb bbls	lb.	.21½	.24½	.20	.24½	.20 .23
Zinc Sulfate, crys, 400 lb bbl, wks	lb.	...	.029	...	.029	.029 .033
Flake, bbls	lb.	...	.0325	...	.0325	.0325 .0375
Sulfide, 500 lb bbls, delv	lb.	.07¾	.08	.07¾	.08⅞	.08⅝ .09¾
bgs, delv	lb.	.07½	.07¾	.07½	.08⅝	.08⅜ .09
Sulfocarbolate, 100 lb kgs	lb.	.24	.26	.24	.26	.24 .26
Zirconium Oxide, crude, 73-75% grd, bbls, wks	ton	75.00	100.00	75.00	100.00	75.00 100.00

Oils and Fats

Babassu, tks, futures	lb.	...	.06⅞	.05⅞	.07⅝	.06⅛	.06¾
Castor, No. 3, 400 lb drs	lb.	.10½	.11¼	.08¼	.11¼	.09¼	.10¾
Blown, 400 lb drs	lb.	.12¾	.13½	.10¼	.13½	.11¼	.13
China Wood, drs, spot NY	lb.	...	.28	.15	.28	.10¼	.15½
Tks, spot NY	lb.	.24	.27	.14½	.27	.095	.15½
Coconut, edible, drs NY	lb.	.09⅜	.10⅛	.08⅛	.10⅛	.08⅛	.09½
Manila, tks, NY	lb.	.03⅞	.04	.02⅞	.04⅝	.03⅛	.04¼
Tks, Pacific Coast	lb.	...	.03¾	.02⅝	.04⅜	.02⅝	.03¾
Cod, Newfoundland, 50 gal bbls	gal.	...	nom.	.29	.35	.35	.52
Copra, bgs, NY	lb.	...	.0250	.0160	.2625	.0170	.0235
Corn, crude, tks, mills	lb.	.06½	.06¾	.05⅛	.07⅛	.063⅛	.08¼
Refd, 375 lb bbls, NY	lb.	.09	.09¼	.07½	.09¾	.09¼	.10½
Degras, American, 50 gal bbls NY	lb.	.09½	.10	.07	.10	.07½	.08¼
English, bbls, NY	lb.	.10	nom.	.07	.10	.07½	.08¼
Greases, Yellow	lb.	.05¾	.05⅞	.03⅞	.06¾	.03½	.05½
White, choice, bbls, NY	lb.	.06	.06½	.04½	.07½	.05	.07
Lard, Oil, edible, prime	lb.	...	.11	.09	.11¼	.10¼	.12¾
Extra, bbls	lb.	...	.10	.08	.10⅜	.08¾	.10¾
Extra, No. 1, bbls	lb.	...	.09¾	.07¾	.10⅛	.08⅝	.09¾
Linseed, Raw less than 5 bbl lots	lb.	...	.107	.092	.116	.089	.115
bbls, c-l, spot	lb.	.099	.101	.084	.11	.081	.102
Tks	lb.	.093	.095	.078	.104	.07½	.096
Menhaden, tks, Baltimore	gal.	.33½	nom.	.21	.35	.34½	.37½
Refined, alkali, drs	lb.	...	.08	.062	.082	.067	.095
Tks	lb.	...	.074	.056	.076	.061	.087
Kettle bodied, drs	lb.	...	.092	.074	.094	.076	.105
Light pressed, drs	lb.	...	.074	.056	.076	.061	.091
Tks	lb.	...	.068	.05	.07	.05½	.08
Neatsfoot, CT, 20°, bbls, NY	lb.	...	.19¾	.14¼	.19¾	.15¼	.17¼
Extra, bbls, NY	lb.	...	.10	.08	.10⅛	.08⅝	.10
Pure, bbls, NY	lb.	...	.16¾	.10¾	.16¾	.10¾	.12¼
Oiticica, bbls	lb	.21	nom.	.09¼	.21	.09¼	.12¾
Oleo, No. 1, bbls, NY	lb.	...	.09¾	.07¼	.12	.08½	.10½
No. 2, bbls, NY	lb.	...	.09¼	.06¾	.11¾	.08	.10
Olive, denat, bbls, NY	gal.	...	1.35	.82	1.40	.86	1.20
Edible, bbls, NY	gal.	2.25	nom.	1.75	2.25	1.75	2.35
Foots, bbls, NY	lb.	.10	nom.	.06¾	.10	.07	.09⅞
Palm, Kernel, bulk	lb.	no prices		.0340	.036	.0325	.04½
Niger, cks	lb.	no prices		.03⅝	.03⅞	...	...
Sumatra, tks	lb.	no prices		.0265	.02¾	.02⅝	.0375
Peanut, crude, bbls, NY	lb.	...	.07½	.06	.08	.07	.08¼
Tks, f.o.b. mill	lb.	.07	nom.	.05¼	.07¼	.06⅜	.08
Refined, bbls, NY	lb.	.10½	nom.	.08¾	.10½	.09¾	.10¾
Perilla, drs, NY	lb	.14	.14½	.09½	.15	.09¾	.11¾
Tks, Coast	lb	.13¼	.13¾	.089	.14	.09	.11
Pine, see Pine Oil, Chemical Section.							
Rapeseed, blown, bbls, NY	lb.	.17	.17½	.14	.17½	.14	.14¾
Denatured, drs, NY	gal	1.05	nom.	.80	.90	.75	.91
Red, Distilled, bbls	lb.	.09	.09½	.06¾	.09½	.07⅜	.10⅝
Tks	lb	...	.08½	.064	.08½	.06½	.09¾
Sardine, Pac Coast, tks	gal	.33	nom.	.24	.38	.28	.46½
Refined alkali, drs	lb.	...	.08	.062	.082	.067	.095
Tks	lb	...	.074	.056	.076	.061	.087
Light pressed, drs	lb.	...	.074	.056	.076	.061	.089
Tks	lb.	...	.068	.05	.07	.05½	.08
Sesame, yellow, dom	lb	no prices		.09	.10½	.10¼	.10½
White, dom	lb	no prices		.09	.10½	.10¼	.10½
Soy Bean, crude							
Dom, tks, f.o.b. mills	lb	...	.06	.04½	.06½	.05⅞	.07
Crude, drs, NY	lb	.06⅝	.06⅞	.05⅛	.07⅛	.06½	.08
Ref'd, drs, NY	lb.	.08⅜	nom.	.06⅛	.08⅜	.07⅝	.097
Tks	lb.	...	.07¼	.05¾	.07¾	.0685	.082
Sperm, 38° CT, bleached bbls NY	lb.	...	.103	.09	.103	.10	.102
45° CT, bleached, bbls, NY	lb.	...	.096	.083	.096	.093	.095
Stearic Acid, double pressed dist bgs	lb.	.12½	.13½	.10	.13½	.10	.12
Double pressed saponified bgs	lb.	.12¾	.13¾	.10¼	.13¾	.10¼	.12¼
Triple pressed dist bgs	lb.	.15½	.16½	.12¾	.16½	.13	.15
Stearine, Oleo, bbls	lb.	.08¼	.08½	.05½	.12	.05½	.08½
Tallow City, extra loose	lb.	.06	nom.	.04⅜	.07	.04¾	.06¾
Edible, tierces	lb.	.06¾	nom.	.04½	.07¾	.06	.07⅝
Acidless, tks, NY	lb.	...	.09¼	.07	.09¼	.07¾	.09¼
Turkey Red, single, drs	lb.	...	...	.06	.08⅜	.06¼	.08½
Double, bbls	lb.	...	...	.08¾	.10⅞	.09½	.13
Whale:							
Winter bleach, bbls, NY	lb.	...	.095	.075	.095	.081	.10
Refined, nat, bbls, NY	lb.	...	.091	.071	.091	.077	.096





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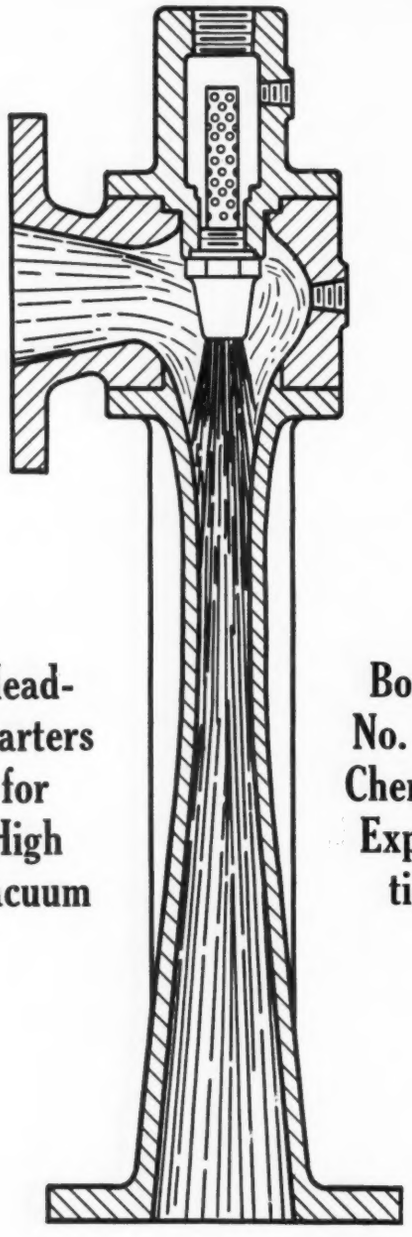

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"We"—Editorially Speaking

The customers paid the chemical industry a neat compliment in October "Fortune's" survey "What Business Thinks" when we just nosed out the automobile industry as first choice of "what particular industry in recent years has, in your opinion made the greatest technological progress?" The box score was:

	Total	Manufacturers	Retailers
Chemical	23.0%	34.7%	15.6%
Automobile	21.8	18.0	24.2
Aviation (air transport, etc.)	15.7	12.2	17.9
Radio and television	13.7	11.5	15.2
Electrical and appliances	7.6	6.1	8.5
Other	16.8	18.5	15.7
Don't know	8.4	6.7	9.4

Du Pont was picked by the businessmen quizzed as the number one company for outstanding technological progress. But it received only 23.1% of votes which must mean a pretty scattered balloting, and "We" are curious enough as to which companies and in what order drew the other bouquets.

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Cerainly much of the success of the chemical industry has been the direct result of constantly lowering prices while improving quality. Perhaps no product exemplifies this better than Du Pont's cellophane which has just had the twentieth consecutive reduction since domestic production was started in 1924. The new price of plain is now only 12 per cent. of the original cost and the moistureproof product is only 26 per cent. of the original figure.

❖❖❖❖

When the "Chemical Consultants" got together at their annual dinner last month at the Chemists' Club they had bacon and beans—Major Charles V. and Professor A. T. by a punning coincidence sitting gleefully side by side.

❖❖❖❖

Did you know that:—

More than 46 million tons of bituminous coal were used for chemical purposes last year?

That 1914's coal-tar dye production which totaled but 6,000,000 pounds by 1937 had reached 122,000,000 pounds?

Fifteen Years Ago

From our files of November, 1924.

George Eastman, president, Eastman Kodak Co., gives $2,500,000 to the 10-million-dollar drive for the University of Rochester.

Beram D. Saklatwalla, Vanadium Corp. of America, receives the Grasselli medal for 1924, in recognition of his work on steel corrosion.

Sir William Alexander, chairman, British Dyestuffs Corp., arrives to confer with Dr. Camille Dreyfus, president of American Cellulose & Chemical Mfg. Co.

Dr. Harvey W. Wiley is honored on his eightieth birthday at a dinner in Washington, D. C., tendered by members of the A. O. A. C.

Plans for a chemical exposition this year are postponed until 1925.

That a quarter of a century ago the United States produced less than one-tenth of the dyes it consumed, and even that meager proportion was made from imported intermediates?

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Perhaps you don't think that the pest control industry is very large but during the next 12 months our national population will invest at least $17,500,000 in pest control service.

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This is just the annual turnover of pest control operators, according to H. G. Irving Sameth, president of the National Pest Control Association. According to the same authority, we probably spend annually 40 million for materials to control household insects, and at least two-hundred million to combat crop-destroying insects doing a damage estimated at 10 times as much.

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"The Chemical Bull in the Financial China Shop" is the title of Bert H. White's article in the December issue. You will recall that he is that banker chap (Vice-president, The Liberty National Bank, Buffalo, N. Y.) whose article in the June 10 issue of *Saturday Evening Post* created such widespread interest and discussion. He doesn't pull his punches when he debunks many pet theories and practices. But you will have, we'll wager, a clearer conception of what the chemical industry is after you have read it.

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To our Editorial Consulting Board, which does not get in the "limelight" very often, we owe a particular debt of gratitude for their many timely, helpful, and constructive suggestions on the subject of articles and authors for our two Special Silver Jubilee Issues.

❖❖❖❖

That item of alleged news appearing in the October issue concerning "Bob" Wilson's election as '41 president of the A. C. S. was not "electioneering"—no, just a little dumb reporting on our part. They say it happens occasionally in the best of regulated families, but that still does not make us like it any better.

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Gleefully *The New Yorker* announces that statistics prove that "chemical engineers make the best husbands."

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"We" hear an awful lot these days about profiteering and very little about profits. Statistics, quite as reliable as *The New Yorker's*, show that even in the lush year of 1929 a majority of this country's corporations earned less than 3% and that 90% of all corporations do not have a business life of twenty years which is supposed to be an average business generation.

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So what?

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Well this, for instance—taxes and technical progress and higher wages all must be paid out of profits somewhere along the line, and unless industry and agriculture make profits we are all of us "in the dog house." The politicians rave against monopoly but "We" ween that all the trusts and cartels in the world have caused less injustice to consumer and workman than the unprofitable business enterprises. It's the weak competition that's the bad competitor and the bad employer. All of which bears a little thinking over.

Be Sure To See "New Chemicals for Industry"

A hearty welcome awaits each and every reader of *Chemical Industries* at our Booth 28 (Main Floor) at the Exposition of Chemical Industries during the week of December 4-9, Grand Central Palace, New York City.

Be sure to visit with us, stop and rest, let us find out for you the answers to those knotty questions that are bothering you. Don't miss the display of the 387 "New Chemicals for Industry"—shown at our booth—disinterested observers call it "The Hit of the Show." We'd like to have your personal reaction.

We'll be celebrating our 25th Birthday—Won't you come to our party? We'll be expecting you!

State of Chemical Trade

Current Statistics (Oct. 31, 1939)—p. 45

WEEKLY STATISTICS OF BUSINESS

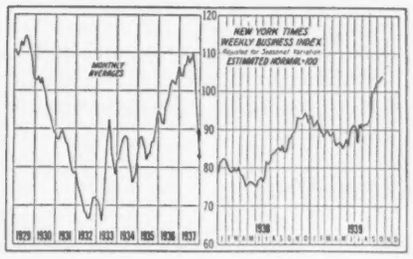
Week Ending	Carloadings 1939	Carloadings 1938	Carloadings % of Change	Electrical Output* 1939	Electrical Output* 1938	Electrical Output* % of Change	Jour. of Com. Price Index	Nat'l Chem. & Drugs	Fertilizer Fats & Oils	Ass'n Fert. Mat.	Price Indices Mixed Fert.	Price Indices All Groups	†Labor Dept. Chem. & Drug Price Index	% Steel Activity	N. Y. Times Index Bus. Act.	Fisher Commodity Index
Sept. 30	834,640	696,908	+19.8	2,469,689	2,139,142	+15.5	81.1	92.4	57.0	72.5	77.2	76.9	78.5	85.0	101.0	119.6
Oct. 7	834,694	702,616	+18.8	2,465,230	2,154,449	+14.4	81.0	**93.8**	53.7	**73.9**	77.2	76.7	77.9	88.0	102.5	120.9
Oct. 14	844.955	726,142	+16.4	2,494,630	2,182,751	+14.3	81.5	93.4	53.7	73.4	77.2	77 2	77.6	90.2	103.2	120.1
Oct. 21	**861,198**	705,628	+22.5	2,493,993	2,214,097	+12.6	82.4	93.4	55.1	72.9	77.3	**77.8**	78.0	91.0	103.5	119.2
Oct. 28	834,096	708,590	+17.7	2,538,779	2,226,038	+14.0	81.6	93.5	53.8	72.9	77.3	77.7	77.9	91.0	104.7	119.5

*K.W.H., 000 omitted †1926-1928 = 100.0. *Bold-faced indices represent new peaks for* 1939.

MONTHLY STATISTICS

CHEMICAL:	Sept. 1939	Sept. 1938	August 1939	August 1938	July 1939	July 1938
Acid, sulfuric (expressed as 50° Baumé, short tons, Bureau of the Census)						
Total prod. by fert. mfrs.	153,897	133,266	161,791	131,106	139,248	109,969
Consumpt. in mfr. fert.	134,287	126,974	115,119	128,312	104,378	92,189
Stocks end of month	74,113	88,165	72,536	85,787	79,786	88,392
Alcohol, Industrial (Bureau Internal Revenue)						
Ethyl alcohol prod., proof gal..	18,104,019	15,759,159	18,538,531	17,421,405	17,642,710	16,370,042
Comp. denat. prod., wine gal...	2,101,669	2,602,376	580,681	1,502,076	542,979	1,303,340
Removed, wine gal.	2,182,218	2,553,002	481,462	1,464,124	527,689	1,221,990
Stocks end of mo., wine gal...	685,736	862,733	767,661	815,966	670,229	779,849
Spec. denat. prod., wine gal. ...	10,523,011	6,555,095	8,608,994	6,343,617	6,893,739	5,407,077
Removed, wine gal.	10,665,877	6,554,118	8,720,379	6,202,383	6,867,719	5,419,830
Stocks end of mo., wine gal...	1,090,504	600,593	1,239,265	606,899	1,344,271	473,520
Ammonia sulfate prod., tons *a*..	52,834	36,403	50,565	34,841	46,526	30,482
Benzol prod., gal. *b*	9,435,000	6,056,000	8,797,000	5,585,000	8,028,000	4,769,000
Byproduct coke, prod., tons *a*..	3,904,321	2,675,089	3,666,068	2,494,471	3,364,799	2,176,612
Cellulose Plastic Products (Bureau of the Census)						
Nitrocellulose sheets, prod., lbs.	861,073	691,688	759,235	725,363	697,609	457,492
Sheets, ship., lbs.	840,886	722,699	741,297	722,518	600,701	523,072
Rods, prod., lbs.	219,012	209,256	243,985	198,860	226,630	142,715
Rods, ship., lbs.	239,439	233,921	244,699	235,948	199,282	162,200
Tubes, prod., lbs.	84,253	74,937	65,426	52,283	54,495	33,371
Tubes, ship., lbs.	76,123	75,702	79,332	58,209	46,844	45,722
Cellulose acetate, sheets, rod, tubes						
Production, lbs.	705,640	592,079	1,041,430	546,422	561,018	658,250
Shipments, lbs.	676,669	615,549	814,634	529,529	536,674	601,724
Molding comp., ship.; lbs. ...	1,152,791	759,027	967,367	484,022	604,476	303,327
Methanol (Bureau of the Census)						
Production, crude, gals.	404,876	303,225	359,594	281,988	377,755	309,218
Production, synthetic, gals.	2,639,934	1,929,655	2,678,983	1,897,847	2,495,394	1,449,607
Pyrozylin-Coated Textiles (Bureau of the Census)						
Light goods, ship., linear yds...	3,291,353	2,427,796	2,819,719	2,481,425	2,259,299	2,329,703
Heavy goods, ship., linear yds..	2,515,824	1,961,017	2,323,008	1,947,342	1,712,002	1,454,946
Pyroxylin spreads, lbs. *c*	6,243,461	4,998,483	5,580,850	4,848,722	4,350,562	3,882,270
Exports (Bureau of Foreign & Dom. Commerce)						
Chemicals and related prod. *d*..	$20,000	$14,300	$15,000	$12,000	$13,459	$9 700
Crude sulfur *d*	$874	$1,321	$1,450	$457	$730	$513
Coal-tar chemicals *d*	$1,114	$1,021	$1,105	$526	$663	$624
Industrial chemicals *d*	$4,152	$1,940	$2,391	$2,117	$2,236	$2,079
Imports						
Chemicals and related prod. *d*..	$11,338	$13,000	$11,224	$10,480	$11,500	$4,800
Coal-tar chemicals *d*	$1,494	$1,623	$1,037	$964	$1,191	$1,555
Industrial chemicals *d*	$1,254	$1,732	$967	$1,523	$1,068	$1,378
Employment (U. S. Dept. of Labor, 3 year av., 1923-25 = 100) Adjusted to 1937 Census Totals						
Chemicals and allied prod., including petroleum	117.6	114.6	109.1	109.3	110.4	105.0
Other than petroleum	116.2	112.7	105.7	106.0	107.6	101.0
Chemicals	123.7	114.5	119.1	112.2	117.1	107.8
Explosives	99.9	88.6	93.3	85.5	91.1	80.5
Payrolls (U. S. Dept. of Labor, 3 year av., 1923-25 = 100) Adjusted to 1937 Census Totals						
Chemicals and allied prod., including petroleum	124.4	118.1	118.9	116.0	117.8	111.1
Other than petroleum	121.2	112.9	113.6	109.2	113.6	103.7
Chemicals	139.7	123.6	136.1	123.2	130.8	114.5
Explosives	114.4	97.6	109.1	97.6	102.8	89.4
Price index chemicals	81.2	81.0	77.5	81.4	78.2	81.7
Chem. and drugs	77.3	77.3	74.6	77.7	75.0	77.7
Fert. mat.	69.2	67.2	67.2	67.3	67.5	66.9
Paint and paint mat.	84.7	80.4	82.1	80.5	82.2	80.5
FERTILIZER:						
Exports (long tons, Nat. Fert. Association)						
Fertilizer and fert. materials ...	.....	.....	141,171	146,636	154,800	112,944
Ammonium sulfate	.....	.....	5,672	5,579	3,008	1,526
Total phosphate rock	.....	.....	98,580	102,919	128,656	85,759
Total potash fertilizers	.....	.....	5,579	8,443	7,870	4,739
Imports (long tons, Nat. Fert. Association)						
Fertilizer and fert. materials ...	.....	.....	75,485	77,452	88,313	57,769
Ammonium sulfate	.....	.....	11,161	9,374	2,335	9,961
Sodium nitrate	.....	.....	9,481	24,450	18,479	8,969
Total potash fertilizer	.....	.....	29,087	27,908	41,234	19,414

INDUSTRIAL TRENDS



Business: Federal Reserve index of industrial activity for October reached 120; 9 points higher than in September. With the exception of the '36 high (121), October's index was the best in 10 years.

Steel: Nearly every district is operating at over 90% of capacity. Mills are now accumulating backlogs for early '40 delivery. It is reported that export demands for heavy goods have formed but a small fraction of the incoming orders.

Automotive: In the week ending Nov. 4, production hit a seasonal peak of 82,690 units, despite the prolonged Chrysler shutdown. November output may reach 330,000 cars, if Chrysler resumes production early in the month, according to *Ward's Reports.*

Wholesale Trade: Total volume of wholesale business in the first 9 months of '39 aggregated $15,000,000,000—one billion dollars better than in the like '38 period. Of the billion-dollar gain, half was accounted for during the 3rd quarter, according to the Dept. of Commerce.

Retail Trade: Department store sales are at the '37 buying level, according to the Dept. of Commerce, and mail-order houses have exceeded this mark.

Commodity Prices: During the week ending Oct. 28, the Bureau of Labor Statistics Index dropped 0.2 point to 79.2—the second definite decrease since the sharp rise from 74.8 to 79.5 during August and September.

State of Chemical Trade
Current Statistics (Oct. 31, 1939)—p. 45

State of Chemical Trade

Current Statistics (Oct. 31, 1939)—p. 46

Construction: Engineering construction contracts in October were valued at $245,062,000. This was 17% better than in September, and 4% over September of '38, according to *Engineering News-Record.*

Textiles: Mills continue to operate at, or near, capacity, although contract backlogs are gradually covering a shorter span of time. At the beginning of October, domestic wool stocks were at a low level—313 million lbs.—less than on any previous Oct. 1 since 1920. Retail buying of wearing apparel is on a more conservative basis than existed a month ago.

Paper and Pulp: September's paperboard output of 445,387 tons was topped by an accumulation of unfilled orders totaling 290,467 tons at the end of the month—biggest backlog in 6 years.

Glass: Keeping pace with automotive activity, most glass plants are working near capacity, and are expected to be kept at this level through the year-end.

Carloadings: Freight movements called for 861,198 cars during the week of Oct. 15-21, thereby setting a 9-year record. General business improvements have resulted in an upward revision of 4.1% in official estimates of 4th quarter loadings. October net operating income, estimated at about $100,000,000, was the best for any month in 9 years.

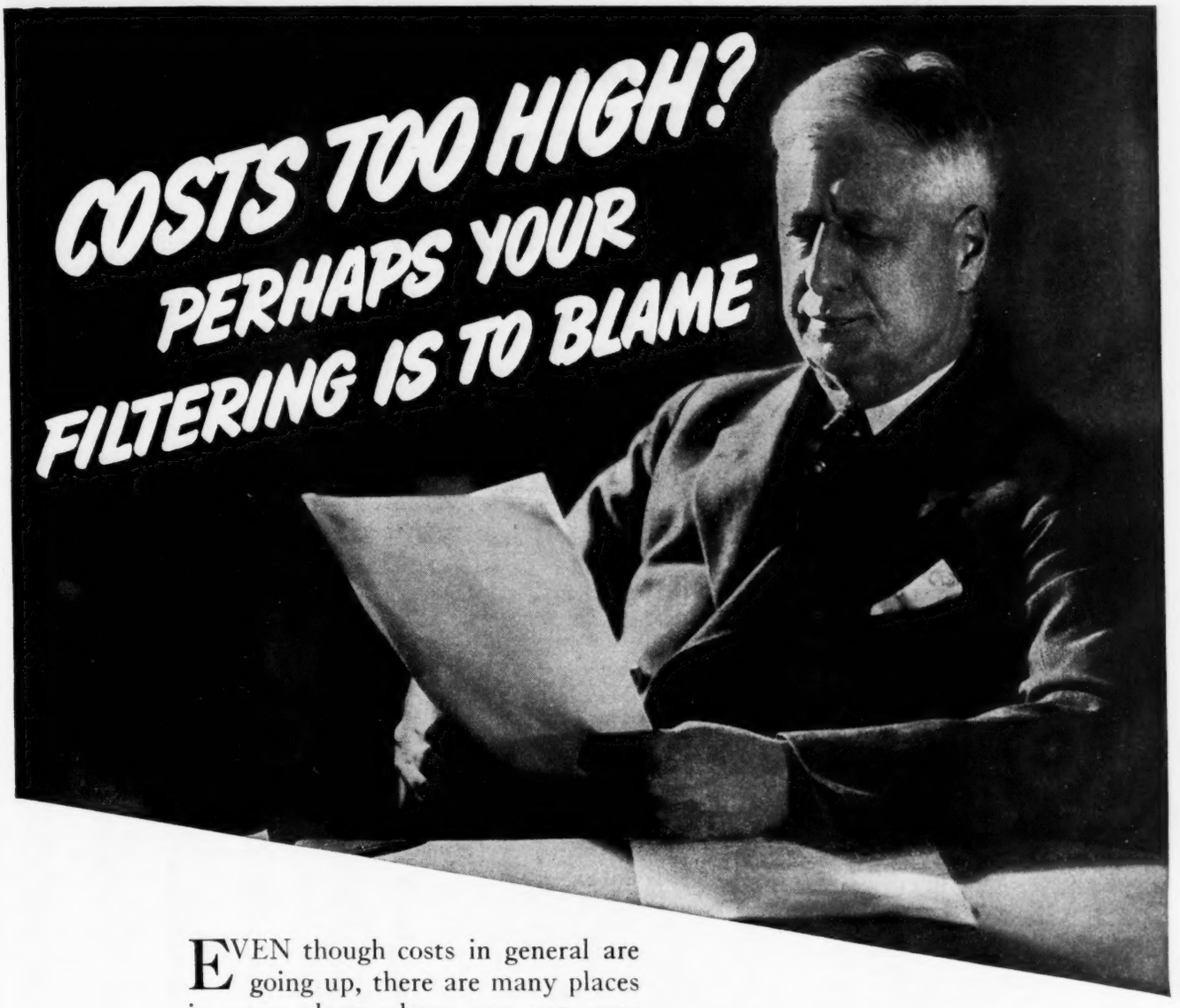
Electric Output: A new record of 2,538,779,000 kwh. was set in the week ended Oct. 28, 14% over the like '38 week.

Outlook: It is felt that industrial production is entering a leveling-out period, while wholesale and retail distribution will continue at a high rate; carloadings in the final October week fell off somewhat from previous high volumes, marking the beginning of the customary Fall slacking-off in freight traffic. General business conditions are expected to remain excellent, and unemployment may be further reduced below the current number (according to the National Industrial Conference Board, there are now less than 9,000,000 unemployed). The scope of the uncertainties of war makes it impossible to predict how domestic trade may be influenced by events overseas, nor is it possible to say what effect the repeal of the arms embargo may have on the export trades, until at least several weeks have elapsed.

MONTHLY STATISTICS (cont'd)

	Sept. 1939	Sept. 1938	August 1939	August 1938	July 1939	July 1938
FERTILIZER: (Cont'd)						
Superphosphate e (Nat. Fert. Association)						
Production, bulk	257,987	229,961	231,128	231,979	206,783	172,650
Shipments, total	351,057	334,084	155,780	146,963	98,565	131,557
Northern area	281,374	261,181	104,123	92,043	68,462	79,814
Southern area	69,683	72,903	51,657	54,920	30,103	51,743
Stocks, end of month, total	1,151,976	1,295,213	1,197,822	1,373,277	1,080,976	1,238,060
Tag Sales (short tons, Nat. Fert. Association)						
Total, 17 states	215,877	226,692	154,865	128,701	51,633	54,805
Total, 12 southern	148,250	140,057	42,992	44,805	47,915	38,101
Total, 5 midwest	67,267	86,635	111,873	83,896	3,718	16,704
Fertilizer employment *i*	99.5	92.1	73.9	77.3	73.4	64.0
Fertilizer payrolls *i*	87.6	77.7	62.7	65.6	63.4	63.1
Value imports, fert. and mat. *d*	$1,983	$3,427	$1,711	$1,842	$2,240	$1,351
GENERAL:						
Acceptances outst'd'g *f*	$215	$261	$235	$258	$236	$264
Coal prod., anthracite, tons	4,776,000	3,388,000	3,832,000	2,336,498	4,290,000	2,571,000
Coal prod., bituminous, tons	37,695,000	32,286,000	34,688,000	28,710,000	26,494,000	23,460,000
Com. paper outst'd'g *f*	$209	$212	$201	$209	$194	$210
Failures, Dun & Bradstreet	758	866	859	1,015	917	1,088
Factory payrolls *i*	93.7	81.6	96.4	88.8	93.5	81.9
Factory employment *i*	100.1	92.0	89.9	77.3	84.4	70.6
Merchandise imports *d*	$181,461	$167,592	$175,756	$165,516	$168,925	$140,836
Merchandise exports *d*	$288,573	$246,361	$250,839	$230,790	$229,626	$227,780
GENERAL MANUFACTURING:						
Automotive production	188,751	83,534	99,868	90,494	209,343	141,443
Boot and shoe prod., pairs	35,901,635	38,280,231	43,580,655	42,252,371	33,617,827	30,741,853
Bldg. contracts, Dodge *j*	$323,227	$300,900	$312,328	$313,141	$299,883	$239,799
Newsprint prod., U. S. tons	77,309	68,315	80,000	67,436	74,933	86,256
Newsprint prod., Canada, tons.	253,230	231,940	236,975	220,303	227,630	202,546
Glass Containers, gross‡	4,250	.....	4,753	4,178	4,580	3,506
Plate glass prod., sq. ft.	13,662,855	8,873,344	10,450,000	7,676,078	6,212,209	5,505,768
Window glass prod., boxes	913,980	882,595	867,452	433,877	690,418	330,223
Steel ingot prod., tons	4,231,000	2,657,748	3,763,000	2,537,000	3,288,000	1,974,000
% steel capacity	73.0	44.8	61.9	42.9	56.5	33.4
Pig iron prod., tons	2,878,556	1,680,435	2,695,913	1,493,000	2,356,000	1,201,785
U.S. cons'pt. crude rub., lg. tons	50,150	37,823	50,481	38,170	43,880	32,209
Tire shipments	5,565,358	3,887,604	4,919,140	3,990,591	5,055,637	3,869,661
Tire production	4,984,505	3,915,873	5,491,664	4,037,715	4,510,123	3,286,864
Tire inventories	8,334,660	8,022,430	8,890,793	8,216,612	8,300,126	8,040,603
Cotton consumpt., bales	624,902	533,399	628,448	561,406	521,405	448,453
Cotton spindles oper.	22,231,976	22,183,972	22,012,186	22,152,526	21,939,404	21,915,394
Silk deliveries, bales	36,869	38,844	33,095	38,504	26,134	32,593
Wool Consumption *z*	36.2	28.5	38.9	33.2	30.1	23.5
Rayon deliv., lbs.	32,800,000	35,800,000	31,300,000	36,700,000	32,900,000	31,900,000
Hosiery (all kinds) *t*	.....	.....	9,739,075	8,291,021	7,748,929	6,593,296
Rayon employment *i*	300.3	302.2	255.1	281.8	297.0	270.5
Rayon payrolls *i*	286.5	282.1	246.6	264.5	283.2	249.5
Soap employment *i*	88.1	82.5	86.0	80.8	81.9	87.6
Soap payrolls *i*	106.5	98.4	102.3	94.9	99.0	87.1
Paper and pulp employment *i*	108.6	104.0	107.0	102.8	105.8	101.6
Paper and pulp payrolls *i*	112.6	101.6	107.7	102.0	101.2	96.9
Leather employment	86.4	79.8	85.5	78.5	85.5	89.3
Leather payrolls *i*	84.3	76.7	83.1	75.7	81.7	69.4
Glass employment *i*	100.0	87.4	98.5	83.7	96.3	74.7
Glass payrolls *i*	104.6	86.7	102.9	91.7	82.5	69.1
Rubber prod. employment *i*	86.0	75.8	82.6	72.3	78.7	68.7
Rubber prod. payrolls *i*	91.4	74.8	86.0	67.7	81.3	64.1
Dyeing and fin. employment *i*	124.9	114.3	122.2	111.8	119.7	97.0
Dyeing and fin. payrolls *i*	107.5	98.1	103.3	95.8	97.9	78.3
MISCELLANEOUS:						
Oils & Fats Index ('26 = 100)	67.0	59.5	48.1	60.6	50.8	63.9
Gasoline prod., bbls.	45,911	46,872	46,899	50,071	45,467	48,913
Cottonseed oil consumpt., bbls.	444,743	261,879	305,000	347,000	246,000	332,986
PAINT, VARNISH, LACQUER, FILLERS:						
Sales 680 establishments	$38,468,830	$31,046,584	$34,448,530	$30,182,013	$30,758,617	$27,946,084
Trade sales (580 establishments)	$21,485,810	$17,431,211	$19,046,555	$17,224,845	$17,215,946	$16,368,159
Industrial sales, total	$13,398,357	$10,492,087	$12,153,308	$9,894,867	$10,713,443	$8,806,128
Paint & Varnish, employ. *i*	123.1	117.2	122.1	115.2	122.2	110.8
Paint & Varnish, payrolls *i*	126.9	116.7	125.6	113.4	124.0	111.0

a Bureau of Mines; *b* Crude and refined plus motor benzol, Bureau of Mines; *c* Based on 1 lb. of gun cotton to 7 lbs. of solvent, making an 8-lb. jelly; *d* 000 omitted, Bureau of Foreign & Domestic Commerce; *e* Expressed in equivalent tons of 16% A.P.A.; *f* 000,000 omitted at end of month: *i* U. S. Dept. of Labor, 3 year average, 1923-25 = 100, adjusted to 1937 census totals; *j* 000 omitted, 37 states; *p* Rayon Organon, formerly an index was given, now the exact poundage is given; *q* 680 establishments, Bureau of the Census; *r* Classified sales, 580 establishments, Bureau of the Census; *s* 53 manufacturers, Bureau of the Census; *t* 384 identical manufacturers, Bureau of the Census, quantity expressed in dozen pairs; *v* In thousands of bbls., Bureau of the Census; ** Indices, Survey of Current Business, U. S. Dept. of Commerce; *z* Units are millions of lbs.; ‡ 000 omitted.



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give maximum flow rates with required clarity on every filtration service

Chemical Finances
October, 1939—p. 46

Chemical Stocks and Bonds

PRICE RANGE October 1939 Last	High	Low	1938 High	Low	1937 High	Low	Sales	Stocks	Par $	Shares Listed	Dividends*	Earnings** $-per-share-$ 1938	1937	1936
							Number of shares							
NEW YORK STOCK EXCHANGE							October 1939	1939						
65⅛	71½	53	61	46¾	55	46	8,900	38,800	Abbott Labs.	No	640,000	$1.70	2.43	2.51	2.21
60½	68	45¼	67⅞	40	80¼	44½	36,000	227,000	Air Reduction	No	2,563,992	1.50	1.47	2.86	2.79
178½	200½	151½	197	124	258½	145	23,100	128,900	Allied Chem & Dye	No	2,214,099	6.00	5.92	11.19	11.44
21¼	24½	16	28½	22	33¾	17⅞	12,300	71,100	Amer. Agric. Chem	No	627,987	1.43	2.23	2.95	1.57
9⅜	11⅞	5½	15	9	30¾	8¼	10,900	78,200	Amer. Com. Alcohol	No	260,930		—2.05	3.23	4.55
32	37	21	31½	20	46	22	2,700	23,800	Archer-Dan.-Midland	No	545,416	1.25	.43	5.03	3.05
62¼	71	50	68	36	94	38	3,600	15,300	Atlas Powder Co.	No	249,163	2.25	2.69	4.40	4.21
123⅞	127	116	126¾	105	133	101	200	3,050	5% conv. cum. pfd.	100	68,597	5.00	14.77	20.90	20.85
28⅛	29¼	13⅜	26⅜	9	41¼	13	87,400	811,300	Celanese Corp. Amer.	No	1,000,000		.26	2.04	2.33
102½	109⅞	84	96	82	115	90	5,700	17,100	prior pfd.	100	164,818	7.00	15.05	27.07	27.25
13⅞	17¼	11½	17	7⅜	25¾	8½	39,300	494,700	Colgate-Palm.-Peet	No	1,962,087	.25	1.77	—.35	1.40
104	107	101⅞	104¼	78	104½	95	600	11,200	6% pfd.	100	233,098	6.00	21.12	3.21	17.13
92	96	73	98½	53¾	125¾	65	5,200	33,000	Columbian Carbon	No	537,406	4.00	5.13	8.31	7.48
13	16	8⅜	12¼	5⅞	21¼	5	72,400	1,189,800	Commercial Solvents	No	2,636,878		—.11	.60	.85
62½	67¼	54⅞	70¾	53	71¼	50½	22,300	178,600	Corn Products	25	2,530,000	3.00	3.18	2.52	3.86
165½	177	150	177	162	171½	153	1,600	7,900	7% cum. pfd.	100	245,738	7.00	39.69	32.96	46.76
23½	32⅜	18	40⅞	25	76⅛	29½	6,380	26,820	Devoe & Rayn. A.	No	95,000	2.00	—1.72	4.05	4.49
138½	143½	101½	141	87⅞	159¾	79½	4,600	60,600	Dow Chemical	No	945,000	3.00	3.91	4.15	4.48
180	188½	126¼	154¾	90½	180⅜	98	54,200	483,800	DuPont de Nemours	20	11,065,762	3.25	3.74	7.37	7.54
119⅞	124⅛	112	120½	109½	112	107½	15,000	28,700	4½% pfd.	No	500,000	4.50	87.27	165.48	.....
126⅛	142	126⅛	138½	130¾	135½	130	24,300	57,900	6% cum. deb.	100	1,092,948	6.00	45.92	81.70	84.21
162½	186⅛	138⅛	187	121½	198	144	19,900	233,900	Eastman Kodak	No	2,250,921	6.50	7.54	9.76	8.23
163	183½	155½	173	157	164	150	1,510	3,820	6% cum.	100	61,657	6.00	281.22	362.45	306.64
33¼	36	18¼	32	19⅞	32¼	18	59,800	223,200	Freeport Texas	10	796,380	2.00	1.87	3.30	2.43
9	10⅞	7	12⅛	6¾	19	8½	7,500	91,200	Gen. Printing Ink	1	735,960	.50	.62	1.32	1.32
18⅜	24½	14	28½	13	51½	19½	29,300	147,600	Glidden Co.	No	829,989	.50	—.29	2.62	3.29
39⅛	47	34	51½	37	58⅛	43	1,200	6,500	4½% cum. pfd.	50	199,940	2.25	1.03	12.72	15.43
108	110¼	93	111	76¾	117½	80⅛	3,300	18,300	Hazel Atlas	25	434,409	5.00	4.97	6.67	6.55
86	101½	63	87	42¾	92½	50	17,900	123,700	Hercules Powder	No	1,316,710	1.50	1.95	2.97	3.24
131	135½	128½	135¼	126¾	135½	125	460	5,210	6% cum. pfd.	100	96,194	6.00	35.31	50.75	48.97
27	29½	16¾	30⅜	14¾	47½	15	18,300	272,300	Industrial Rayon	No	759,325	.25	.24	.34	2.24
42¼	46¼	17½	34½	15	64¼	20	23,400	79,500	Interchem.	No	289,618		.32	1.44	3.02
104	108	90	98	80	111½	92	1,150	5,820	6% pfd.	100	65,661	6.00	7.39	12.26	18.97
3	3⅜	1½	3⅞	2	9⅛	2	20,700	56,500	Intern Agricul.	No	436,048			.16	—1.55
38¾	41	16	29	15	63½	18¼	8,200	18,100	7% cum. pfd.	100	100,000	2.00	7.01	7.70	.23
40¼	55¾	36½	57⅝	36⅞	73⅜	37	182,900	1,086,700	Intern. Nickel	No	14,584,025	2.00	2.09	3.31	2.40
34⅞	38	29	30¼	19½	28¾	19½	1,500	15,000	Intern. Salt	No	240,000	2.00	2.29	2.11	1.70
21¼	22	14½	24	19⅛	36	19¼	400	8,200	Kellogg (Spencer)	No	509,213	1.40	.71	2.81	2.62
51⅝	56¾	36½	58⅜	23¼	79	33⅜	48,200	229,900	Libbey Owens Ford	No	2,509,750	1.25	1.57	4.19	4.14
15	19	13½	21½	12⅛	26⅞	14	13,400	71,600	Liquid Carbonic	No	700,000	1.25	1.81	2.37	1.58
31¼	37⅜	20¾	36⅞	19¾	41¾	22	24,100	95,200	Mathieson Alkali	No	828,171	1.50	1.01	1.81	1.76
108½	114¾	85¾	110	67	107½	71	13,900	95,000	Monsanto Chem.	No	1,241,816	2.00	2.35	4.40	4.01
116	121	110	117½	111	109	105	440	3,890	4½% pfd. A	No	50,000	4 50	31.51	49 99	.....
119½	122½	112	...	...	...	...	660	8,330	4½% pfd. B	No	50,000	4.50	31.51	49.99	.....
22⅜	27½	17⅞	31	17¼	44	18	39,000	372,100	National Lead	10	3,095,100	.50	.75	95	1.71
160	173⅛	152	178½	154	171	153	1,200	6,000	7% cum, "A" pfd.	100	213,793	7.00	26.03	22 86	33.83
135¾	145	132	145½	127	150	127	390	5,830	6% cum. "B" pfd.	100	103.277	6.00	35.97	43.77	74.50
14¾	17¾	8½	19½	9⅞	41¾	10⅝	40,000	416,000	Newport Industries	1	621,359		—.08	2.22	.99
65¾	70	50	76¼	40	103¾	51⅛	25,300	192,600	Owens-Illinois Glass	12.50	2,661,204	1.50	2.02	3.51	3.80
63½	65	50⅝	59	39½	65½	43¼	21,500	220,700	Procter & Gamble	No	6,325,087	2.00	2.59	4.08	2.39
116½	119¾	112	122¼	114	118½	114½	810	14,080	5% pfd.	100	169,517	5.00	101.81	157.05	94.14
14	17¼	9⅞	18⅜	10	34¾	14⅞	24,200	216,000	Shell Union Oil	No	13,070,625	.70	.70	1.44	1.35
102½	107	98½	106½	93	105⅜	91	2,800	21,000	5½% cum. pfd.	100	341,000	5.50	33.18	60.59	57.20
22	29½	15½	34¾	18½	60⅜	26½	7,200	97,800	Skelly Oil	No	995,349	1.00	2.27	6.07	4.42
97⅞	98	92	98	84	102¼	88	600	14,600	6% cum. pfd.	100	64,500	6.00	41.09	97.86	73.16
27⅜	30	22¾	35½	24¾	50	26½	55,800	547,600	S. O. Indiana	25	15,272,020	1.00	1.82	3.16	3.09
46⅞	53½	38	58⅛	39¾	76	42	113,100	918,100	S. O. New Jersey	25	26,618,065	1.50	2.86	5.64	3.73
7⅝	9⅛	4	8	3⅞	15⅜	5¼	17,500	166,000	Tenn. Corp.	5	853,696	....	.46	1.09	.41
46⅞	50¾	32½	49⅝	37⅝	65⅛	34¾	114,400	893,300	Texas Corp.	25	10,876,882	2.00	2.13	5.02	4.10
36	38½	26	38	26	44	23¼	39,200	281,100	Texas Gulf Sulphur	No	3,840,000	2.00	1.81	3.02	2.57
87⅜	94½	65½	90⅞	57	111	61¼	56,500	597,300	Union Carbide & Carbon	No	9,073,288	2.40	2.77	4.81	4.09
66⅝	69½	52	73½	39	91	36¾	11,900	48,000	United Carbon	No	397,885	3.25	3.78	5 91	5.54
25¼	29⅜	13½	30¼	13½	43⅝	16⅝	10,300	130,500	U. S. Indus. Alcohol	No	391,238	....	—1.08	1.24	—.20
36¼	40	16	28⅞	11½	39⅜	9¼	80,000	483,600	Vanadium Corp. Amer.	No	376,637	....	.61	2.22	.40
27¾	28½	18¼	25¼	13½	...	...	4,800	70,800	Victor Chem.	5	696,000	.90	1.05	1.01	1.16
4½	5¾	2½	5⅜	2¾	12¾	2¼	20,300	151,500	Virginia-Caro. Chem.	No	486,122	....	—1.80	—.05	—2.44
29½	33¾	17	32½	15¾	74⅜	18½	21,400	78,400	6% cum. part. pfd.	100	213.052	....	1.90	5.88	.44
30¾	31½	15¼	20⅛	10	27¼	10¾	9,300	52,400	Westvaco Chlorine	No	339,362	1.00	1.52	1.46	1.17
35⅛	36	29	31½	20	34⅞	21⅛	5,300	27,100	cum. pfd.	30	192,000	1.50	4.19	4.09	3.26
NEW YORK CURB EXCHANGE															
33¼	35¾	18⅜	30⅛	15½	37	17⅜	57,900	420,300	Amer. Cyanamid "B"	10	2,520,368	.45	.91	2.09	1.77
109	110	76	92	50	124	69	3,100	14,135	Celanese, 7% cum. 1st pfd.	100	148,179	8.53	8.95	22.32	24.47
4½	6¾	3	6¾	3	15	3	1,100	8,325	Celluloid Corp.	15	194,952	....	—2.73	—.92	—.80
5¾	7⅜	4½	12	6½	14⅜	10½	200	3,300	Courtauld's Ltd.	£1	24,000,000	.29	.26%	8.64%	8.30%
7	9¼	5	9⅞	6	10⅜	3½	2,000	16,800	Duval Texas Sulphur	No	500,000		.71	.43	.61
60	63	30	41¾	27	47½	31	3,700	10,400	Heyden Chem. Corp.	100	149,643	1.50	2.07	3.94	3.56
102	117	90	115½	55	147½	77	5,600	55,900	Pittsburgh Plate Glass	25	2,142,443	1.75	3.00	8.53	7.15
95¼	113½	81	117¾	66	154¾	72¼	11,450	47,750	Sherwin Williams	25	638.927	2.50	2.43	8.76	8.04
111¾	115¾	106½	114½	107	114	106¼	470	2,850	5% cum. pfd.	50	132,189	5.00	8.76	45.50	41.44
PHILADELPHIA STOCK EXCHANGE															
165	179	135	167	121½	179	115	850	3,975	Pennsylvania Salt	50	150.000	4.50	6.90	11.79	8.57

PRICE RANGE October 1939 Last	High	Low	1938 High	Low	1937 High	Low	Sales	Bonds	Date Due	Int. %	Int. Period	Outstanding $
NEW YORK STOCK EXCHANGE							October 1939	1939				
102	103½	98	105⅜	99½	109½	99	827,000	3,582,000	Amer. I. G. Chem. Conv.	1949	5½	M-N	$25,300,000
35½	36	19	38	25⅛	42½	23	149,000	925,000	Anglo Chilean Nitrate inc. deb.	1967	4½-5	J	12,067,000
105	108¾	101¾	106⅛	102¾	102⅞	100⅛	35,000	315,000	Dow Chemical	1951	3	J-D	5,000,000
102	103½	99⅞	102¾	100	102	98½	3,000	181,000	Int. Agric. Corp. 1st Coll. tr. stpd. to 1942	1942	5	M-N	5,633,000
31	35	21½	35⅜	24¾	35⅜	21½	118,000	1,381,000	Lautaro Nitrate inc. deb.	1975	4	J-D	30,500,000
25	30	25	35⅜	24¾	25½	20½	.....	15,000	Ruhr Chem.	1948	6	A-D	1,500,000
94⅛	94¼	88¾	...	...	...	...	1,043,000	1,691,000	Shell Union Oil	1954	2½	J-J	85,000,000
104½	105	98	104⅛	90¼	102¾	94	151,000	799,000	Skelly Oil	1951	4	J-J	9,000,000
103¾	106¼	97⅛	105⅜	100	102	95	671,000	4,483,000	Standard Oil Co. (New Jersey) deb.	1961	3	J-D	85,000,000
101⅞	106½	94¼	103	98	...	...	815,000	3,769,000	Standard Oil Co. (New Jersey) deb.	1953	2¾	J-J	50,000,000
107¼	108⅝	102	103	95	105	93½	509,000	3,814,000	Texas Corp.	1951	3½	J-D	60,000,000
101¾	105½	95¼	...	...	...	...	1,363,000	3,850,000	Texas Corp.	1959	3	A-O	40,000,000
110	118½	96	101	77	111	81	191,000	1,049,000	Vanadium Corp. conv.	1941	5	A-O	2,800,000

* Paid in 1938, including extras but excluding dividends paid in stock. ** For either fiscal or calendar year.

The Month's New Trade Marks

Trade Mark Descriptions†

370,359. Andrew Wilson, Inc., Springfield, N. J.; Aug. 12, '38; for liquid soap insecticide; spreader; use since June 16, '38. Not subject to opposition.

370,361. Cato Oil & Grease Co., Oklahoma City, Okla.; Sept. 26, '38; for lubricating oils and greases; use since Apr. 18, '38. Not subject to opposition.

370,363-4. A. Krasne, Inc., N. Y. City; Sept. 26, '38; for general household cleanser and ammonia; use since July 8, '38. Not subject to opposition.

370,374. The Selig Co., Atlanta, Ga.; Apr. 26, '39; for insecticides; use since Jan. 1, '38. Not subject to opposition.

370,375. William Tyrell Jones (Wm. Tyrell Jones Co.), Detroit, Mich; Apr. 28, '39; for compounds for exterminating pests; use since Oct., '36. Not subject to opposition.

370,816. The Truscon Labs., Detroit, Mich.; for chemical colorant and binder for cast cement floors and the like; use since July 2, '38. Not subject to opposition.

370,821. Masonite Corp., Chicago, Ill.; Sept. 3, '38; for paste adhesives; use since June 16, '38. Not subject to opposition.

370,834. Thomas R. Burns (Co-Burn Prods. Co.), Cincinnati, O.; June 6, '39; for cleaning compound for fabrics and painted surfaces; use since June 15, '28. Not subject to opposition.

370,835. A. J. Bergren Co., Inc., Chicago, Ill.; for shoe cleaner and shoe soap; use since June 31, '35.

387,911. Magic Chem. Co., Salt Lake City, Utah; Jan. 18, '37; for wax polishes; use since May 12, '31.

403,196. Chem-Alpha, Inc., Brooklyn, N. Y.; Feb. 19, '38; for boiler and radiator cleansers and like specialties; use since Jan. 15, '38.

405,494. General Chem. Co., N. Y. City; Apr. 20, '38; for lye; use since Jan., '27.

406,952. The Universal Motor Oils Co., Wichita, Kans.; May 31, '38; for lubricant motor oils and greases; use since Apr. 25, '38.

407,549. Hudson Oil Co., Kansas City, Kans.; June 16, '38; for lubricating oil; use since Jan. 31, '36.

410,361. The Harrison Paint & Varnish Co., Canton, O.; Sept. 8, '38; for ready-mixed paints, paint enamels, and varnish; use since June 2, '33.

407,082. Santiago Alvarez (Alvarez Mfg. Co.), Laredo, Tex.; June 4, '38; for general cleaner; use since May 1, '35.

410,473. Herman Niere, St. Louis, Mo.; Sept. 12, '38; for termite-exterminating paste; use since Sept. 20, '37.

413,673-4. The Hygienic Prods. Co., Canton, O.; Dec. 10, '38; for cleansing powder for water-closets and auto radiators; use since Sept. 1, '38.

413,955. Osmose Wood Preserving Co. of America, Inc., Buffalo, N. Y.; Dec. 17, '38; for chemical compositions for impregnating and treating wood; use Jan. 18, '35.

413,971. Hudson Oil Co., Kansas City, Kans.; for Dec. 17, '38; for lubricating oil; Aug. 1, '37.

414,014. Society of Chemical Industry in Basle, Basel, Switzerland; Dec. 19, '38; for synthetic resin lacquers and varnishes; Sept. 26, '38.

414,590. Chrysler Corp., Highland Park, Mich.; Jan. 7, '39; for braking fluids, anti-freeze and anti-corrosion solutions; use since Aug. 1, '37.

415,027. American Extract Co., Port Allegany, Pa.; Jan. 20, '39; for hide-treating solution; use since June 14, '32.

415,217. The Fyr-Fyter Co., Dayton, O.; Jan. 25, '39; for fire-extinguishing chemicals; and for anti-freeze solutions and insecticides; use since Mar. 18, 1916.

415,268. Smith & Gregory, Amarillo, Tex.; Jan. 26, '39; for metal coating preparation; use since Nov. 3, '38.

415,343. A. M. Meincke & Son, Inc., Chicago, Ill.; Jan. 28, '39; for powdered filler for paper-making; use since Dec. 13, '38.

415,765. Harry Champlin, Beverly Hills, Calif.; Feb. 8, '39; for photographic accelerator and hardening agent for fine grain developers; use since Sept. 7, '38.

416,084. Fraser Companies, Ltd., Edmundston, New Brunswick, Canada; Feb. 15, '39; for wood and chemical pulp; use since Sept. 23, '31.

417,062. Rex Chem. Co., Chelsea, Mass.; Mar. 14, '39; for waterproofing compound for leather; use since Mar. 1, '37.

417,778. Richard D. Pelicano, Washington, D. C.; for gasoline, lubricating oils and greases; use since Nov. 15, '38.

417,888. Osmic Chem. Co., to The Elliott Corp., both of Boston, Mass.; Apr. 5, '39; for chemically-treated shoe cleaners; use since Mar. 1, '39.

418,119. Bernard M. Solomon (Tankar Filling Stations), Montgomery, Ala.; Apr. 11, '39; for fuel oil; use since Sept. 1, '33.

418,179. Alabama Insecticide Co., Gadsden, Ala.; Apr. 13, '39; for insecticides; use since Feb. 1, '39.

418,148. Hasco Prods., Ltd., New Westminster, Brit. Col., Canada; Apr. 12, '39; for marine glue; use since June 1, '35.

418,244. Hygienic Tube & Container Corp., Newark, N. J.; Apr. 14, '39; for cellulose acetate, nitrate, and acetate stearate plastic containers; use since Oct. 15, '38.

418,290. Chemische Fabrik Joh. A. Benckiser G. m. b. H., Ludwigshafen-am-Rhine, Germany; Apr. 15, '39; for chemical preparations for preventing coagulation of animal blood; use since Sept., '37.

418,316. Frank J. Sowa (Silbrite Chem. Co.), N. Y. City; Apr. 15, '39; for silver and metal tarnish preventing fluid; use since Sept., '38.

418,661-2. Wadsworth & Woodman Co., N. Y. City; Apr. 24, '39; for oilcloth, enameled oilcloth, and pyroxylin-coated oilcloth; use since '25.

419,172. Hermanus Pieter Bendien, Naarden, Netherlands; May 8, '39; for artificial fertilizer; use since Nov. 12, '29.

418,993. Talco Asphalt and Refining Co., Mt. Pleasant, Tex.; May 2, '39; for paving and roofing asphalts; use since Mar. 3, '39.

419,058. Ellis Labs., Inc., Montclair, N. J.; May 3, '39; for fertilizer; use since Sept. 29, '38.

419,209. Earl O. Meyer (Moe-Nade Labs.), Denver, Colo.; May 8, '39; for preparation for cleaning and polishing glass; use since Sept. 1, '38.

419,213. Roy E. Swartz (Aerolene Sales Co.), Los Angeles, Calif.; May 8, '39; for nonacid motor oil purifier; use since Nov. 28, '35.

419,223. General Printing Ink Co., N. Y. City; May 9, '39; for printing ink; use since 1912.

419,375. Grand Rapids Varnish Corp., Grand Rapids, Mich.; May 13, '39; for material composed of rubber and synthetic resins, to be applied as a spray coating; use since Apr. 11, '39.

419,385. John Lucas and Co., Inc., Phila., Pa.; May 13, '39; for varnish-type sealer; use since Mar. 3, '39.

419,411. The American Prods. Co. (Veeco Chem. Prods. Co.), Cincinnati, O.; May 15, '39; for paint, turpentine, and furniture polishes; use since Apr. 27, '39.

419,468. P. Beiersdorf & Co., Inc., L. I. City, N. Y.; May 16, '39; for adhesive made of halogenated rubber suitable for sealing tape; use since Apr. 20, '39.

† Trademarks reproduced and described are those appearing in the *U. S. Patent Gazettes*, Aug. 8 to Sept. 5. See also next page.

The Month's New Trade Marks

(*Trade Marks Continued*)

419,784. Xterminator Prods. Corp., Jersey City. N. J.; for insecticides; use since Feb. 1, '39.

419,526. John R. Richards (Continental Chem. and Color Co.), Chicago, Ill.; May 17, '39; for compound preventing scale formation in boilers, etc., and for eliminating scale therefrom; use since Feb. 3, '39.

419,716. E-Z-R Prods. Co., Glendale, Calif.; May 23, '39; for hand cleansing cream, auto finish cleaner, and paint and linoleum cleaner; use since Aug. 14, '38.

419,811. Otto A. Kohl (Bupane Gas Co.), Cedar Rapids, Ia.; May 25, '39; for liquefied petroleum gas; use since Dec. 15, '33.

419,852-4. Cities Service Oil Co., Bartlesville, Okla.; May 26, '39; for ready-mixed paints, primers, varnishes, and lacquers; use since May 16, '39.

419,875. The Petrol Corp., Los Angeles, Calif.; for gasoline; use since May 9, '39.

419,900. Impregnole Corp., N. Y. City; May 26, '39; for perspiration odor-preventing chemicals for use on textile fabrics, leather, and paper; use since Apr. 1, '39.

419,957. Franklin J. Drivness (Franklin Chem. Co.), Rochester, N. Y.; May 29, '39; for alkaline powdered cleanser and cleaner; use since May 12, '39.

420,027. Strauss Stores Corp., Maspeth, N. Y.; May 31, '39; for lubricating oils and greases; use since Mar., '37.

420,028. I. Mayer Strauss (Admiral Products Co.), Maspeth, N. Y.; May 31, '39; for paints and varnishes; use since Feb. 18, '38.

420,038. Turpentine & Rosin Factors, Inc., Jacksonville, Fla.; May 31, '39; for pure gum turpentine; use since Dec. 1, '38.

420,109. National Aniline & Chem. Co., Inc., N. Y. City; June 2, '39; for dyestuffs; use since Apr. 12, '39.

420,121. Ira A. Watson Co., Knoxville, Tenn.; June 2, '39; for ready-mixed paints; use since May, '32.

420,147. Socony-Vacuum Oil Co., Inc., N. Y. City; June 3, '39; for motor anti-freeze; use since May 17, '39.

420,148. Socony-Vacuum Oil Co., Inc., N. Y. City; June 3, '39; for floor primer and sealer; use since May 17, '39.

420,150. Sylvania Industrial Corp., Fredericksburg, Va., and N. Y. City; June 3, '39; for polyvinyl resin-containing adhesive; June 5, '31.

420,160. The Black and Decker Mfg. Co., Towson, Md.; June 5, '39; for combined polish and cleaner for automobiles; Apr. 14, '39.

420,164. The Chicagrow Corp., Chicago, Ill.; June 5, '39; for fertilizer; use since May 31, '39.

420,170. The Emulsol Corp., Chicago, Ill.; June 5, '39; for foaming and emulsifying detergent base, for the formulation of rug cleaning preparations; use since Feb. 4, '38.

420,286. Nat'l. Ref'g. Co., Cleveland, O.; June 8, '39; for motor anti-freeze; use since May 9, '39.

420,309. The Black and Decker Mfg. Co., Towson, Md.; June 9, '39; for polish and cleaner for automobile bodies; use since Apr. 14, '39.

420,322. Hanson-Van Winkle-Munning Co., Matawan, N. J.; June 9, '39; for metal electroplating electrodes; use since Jan. 27, '36.

420,365. Fels & Co., Phila, Pa.; June 10, '39; for soap chips; use since May 22, '39.

420,390. Scud Research Labs., Calumet Park, Ill.; June 10, '39; for deodorizing, cleansing, and stain-removing compounds; use since May 16, '39.

420,456. The Hart Prods. Corp., N. Y. City; June 13, '39; for soaps and soap preparations; use since June 9, '38.

420,464. Sherwin-Williams Co., Cleveland, O.; June 13, '39; for paints; use since May 1, '39.

420,502. Phoenix Color & Chem Co., Paterson, N. J.; June 15, '39; for dyestuffs; use since Nov. 23, '38.

420,589. I. F. Laucks, Inc, Seattle, Wash.; June 16, '39; for primers and undercoaters including a germicidal or fungicidal inhibitor; use since June 6, '39.

420,596. National Oil Products Co., Harrison, N. J.; June 16, '39; for sulfated and sulfonated organic materials adapted for use in cosmetic and pharmaceutical preparations; use since June 13, '39.

420,637. Hunter Mfg. Corp., Bristol, Pa.; June 17, '39; for emergency chemical flares; use since Oct. 1, '38.

420,610. Jeannette Gluck, N. Y. City; Apr. 10, '39; for preparation prolonging the life of silk hosiery and the like; use since Apr. 10, '39.

420,675. The Haloid Co., Rochester, N. Y.; June 19, '39; for light-sensitive paper; use since Mar. 8, '39.

420,709. Alumileaf Co., Los Angeles, Calif; June 20, '39; for stabilizer for aluminum paste, powder, or paint; use since June 2, '39.

420,743. Armstrong Cork Co., Lancaster, Pa.; June 21, '39; for ingredients for the preparation of a plastic composition comprising latex and a hydraulic setting cementitious material; June 30, '38.

420,773. Marine Paint & Varnish Co., Inc., New Orleans, La.; June 21, '39; for paints, driers, putty, and japan colors; use since July, '20.

420,794. Monroe Chem. Co., Quincy, Ill.; June 22, '39; for dyes and bluing; use since Dec. 1, 1894.

420,799. American Abrasives Metals Co., N. Y. City; June 22, '39; for rubber base compound for manufacture a synthetic flooring, bonding, and insulating composition; use since June 9, '39.

420,800. Asphalt Process Corp., N. Y. City; June 22, '39; for liquid asphalt cut back which may or may not contain fillers; use since May 24, '39.

420,821. E. F. Houghton & Co., Phila., Pa.; June 22, '39; for lubricants for wet wire-drawing operations; use since Mar. 31, '39.

420,868. Joseph B. Liebner, Philadelphia, Pa.; June 23, '39; for soldering paste; use since June 17, '39.

420,870. Nayler Chem. Co., Phila., Pa.; June 23, '39; for granular cleaner for glass, silver and other tableware; use since June 20, '39.

420,872. George D. Pickrell (Geo. D. Moore), Chicago, Ill.; June 23, '39; for wax remover; use since May 31, '39.

420,948. Geo. G. Grupe, Jr., Bell, Calif.; June 26, '39; for motor lubricating oils; use since June 8, '39.

420,961. Main Labs., Inc., Olympia, Wash.; June 26, '39; for liquid gas, particularly chlorine; use since Oct., '34.

420,975. Stein, Hall & Co., Inc., N. Y. City; June 26, '39; for starch-derived sizing; use since Mar. 17, '39.

421,056. Sandy Valley Grocery Co., Ashland, Ky.; June 28, '39; for cleaners for general use; use since May 19, '39.

421,082. Louis M. Goldman (Lou-Bob Co.), Chicago, Ill.; June 29, '39; for denatured alcohol anti-freeze; use since June 15, '39.

421,168. Louis Earle Timson (Timson's), Boston, Mass.; June 30, '39; for leather-treating compound in liquid form for retail distribution; use since July 1, '38.

421,261. Sears, Roebuck and Co., Chicago, Ill.; July 3, '39; for moth-proofing solution; use since Mar. 12, '39.

Descriptions to be continued.

Naval Stores, 1938-39

Statistics presented on these 2 pages, covering the seasons of 1938-39 and the 2 previous like periods, are taken from the annual report of the Bureau of Chemistry and Soils, U. S. Dept. of Agriculture, compiled by C. F. Speh, Naval Stores Research Division.

In considering the production figures, it should be borne in mind that gum naval stores production is seasonal. Normally, approximately 72% of the total annual gum crop is produced from April through September. Wood naval stores production, on the other hand, is not seasonal, but based largely upon estimated consumer demand. For this reason, figures for wood naval stores production are best compiled at the end of the crop year. The crop year extends from the first of April to the thirty-first of March in the following year.

Data have been included on reported production of sulfate wood rosin. These figures are given as 500-lb. (gross) bbls. of rosin and are the figures for resin acids reported, or are derived from the reported production of crude liquid rosin—a mixture of fatty and resin acids. The statistics supplied are expressed in commercial units, for turpentine, as bbls. of 50 gals., and for rosin, bbls. of about 500 lbs. (gross). The figures compiled by government and other sources are not presented as being complete or exact, but are the result of an effort to obtain reports on production at stills, from each producer, and on distribution from dealers and consumers.

Data Estimated, Not Reported

Production gum turpentine	13,789 units
Production wood turpentine	100 units
Consumption turpentine	1,050 bbls.
Consumption rosin	7,750 bbls.
Consumer stocks of turpentine:	
gum	75 bbls.
wood	68 bbls.

Gum Turpentine Production

(Percentage by States)

States	Per cent.		
	1938-39	1937-38	1936-37
North Carolina	[1]	.15	.14
South Carolina	2.69	2.90	3.01
Georgia	57.24	57.06	57.29
Florida	27.86	26.39	25.81
Alabama	8.38	9.65	10.58
Mississippi	3.11	3.08	2.30
Louisiana	.72	.40	.48
Texas	[2]	.87	.89
Totals	100.00	100.00	100.00

[1] Figures for '36-'37 include estimate for 1 producer.
[2] Combined with Louisiana.

Details of Production

(By naval stores seasons beginning April 1 and ending the following March 31)

	TURPENTINE (Bbls.—50 gals.)			ROSIN (Bbls.—500 lbs. gross)		
	1938-39	1937-38	1936-37	1938-39	1937-38	1936-37
Gum	534,291	518,454	482,787	1,792,951	1,709,157	1,565,240
Reclaimed Gum	.....	.....	.....	39,979	26,271	42,694
Steam Dist. Wood	129,091	136,292	122,388	762,913	803,538	724,028
Sulfate Wood	40,467	38,500	22,635[1]	16,548	23,000[2]	.....[3]
Dest. Dist. Wood	5,369	7,085	6,710	.....	.....	.....
Totals	709,218	700,331	634,520	2,612,391	2,561,966	2,331,962

Table 5—GUM TURPENTINE AND ROSIN PRODUCTION BY STATES[4]

States						
North Carolina	[5]	785	682	[5]	2,856	2,260
South Carolina	14,387	15,044	14,570	50,156	52,067	45,040
Georgia	305,791	295,809	276,681	1,016,643	982,086	894,898
Florida	148,870	136,846	124,585	504,691	436,366	409,705
Alabama	44,730	50,030	51,077	149,649	168,362	164,705
Mississippi	16,652	15,973	11,080	58,639	54,638	36,103
Louisiana	3,861	2,065	2,245	13,173	7,076	6,581
Texas	[6]	1,902	1,867	[6]	5,706	5,948
Totals	534,291	518,454	482,787	1,792,951	1,709,157	1,565,240

[1] Production figures for 1936-37 include estimate for one producer. [2] Compiled from a reported total production of approximately 10,800 tons of liquid rosin. [3] Information not available. [4] Does not include reclaimed rosin. [5] Combined with South Carolina. [6] Combined with Louisiana.

For comparison with earlier periods please refer to Statistical and Technical Data Section, p. 113, July 1938 (Naval Stores, 1936-37); also, Statistical and Technical Data Section, p. 119, January 1938 (Naval Stores, Season Apr. 1, 1937-Sept. 30, 1937).

Summary of Supply, Distribution and Carryover of Turpentine and Rosin

(By naval stores seasons beginning April 1 and ending the following March 31)

	TURPENTINE (Bbls.—50 gals.)			ROSIN (Bbls.—500 lbs. gross)		
	1938-39	1937-38	1936-37	1938-39	1937-38	1936-37
Table 1—SUPPLY AND DISTRIBUTION						
Carryover April 1	218,774	223,364	230,136	999,347	663,251	765,807
Production	709,218	700,331	634,520	2,612,391	2,561,966	2,331,962
Imports	2,434	14,335	15,929	49	336	2,418
Available Supply	930,426	938,030	880,585	3,611,787	3,225,553	3,100,187
Less Carryover March 31	314,323	218,774	223,364	1,621,970	999,347	663,251
Apparent Total Consumption	616,103	719,256	657,221	1,989,817	2,226,206	2,436,936
Less Exports	210,226	276,530	271,353	821,381	1,034,472	1,099,438
Apparent U. S. Consumption	405,877	442,726	385,868	1,168,436	1,191,734	1,337,498
Table 2—PRODUCTION AND IMPORTS						
Gum	534,291	518,454	482,787	1,832,930[1]	1,735,428[1]	1,607,934
Wood	174,927	181,877	151,733	779,461	826,538	724,028
Imports	2,434	14,335	15,929	49	336	2,418
Totals	711,652	714,666	650,449	2,612,440	2,562,302	2,334,380
Table 3—CARRYOVER (Stocks)						
Carryover April 1	218,774	223,364	230,136	999,347	663,251	765,807
Carryover March 31	314,323	218,774	223,364	1,621,970	999,347	663,251
(12 months later)						
Increase	95,549			622,623	336,096	
Decrease		4,590	6,772			102,556

[1] Includes reclaimed rosin.

Naval Stores, 1938-39

Production, Distribution, Carryover—p. 4

Average Prices of Gum Turpentine and Gum Rosin, 1936-37-38-39[1]

Season	Gum Turpentine Cents per gal.	Gum Rosin[2] Dollars per bbl.[3]
1936-37	37.48	6.42
1937-38	31.36	7.35
1938-39	22.61	5.02

[1] Weighted season averages. [2] Rosin grades included in average prices: B, D, E, F, G, H, I, K, L, M, N, WG, WW, X. [3] Bbl., 280 lbs. gross weight; note that this unit is not the same as in some previous reports, where the unit was the 500-lb. bbl.

Estimation of Average Prices

Monthly prices of gum turpentine were obtained by averaging the Wednesday and Saturday closing prices. The season average was obtained by multiplying each monthly price by the combined reported receipts during that month (at Savannah, Ga., Jacksonville and Pensacola, Fla.), and dividing the total of these figures for the season by the total receipts for that season, thereby giving the months of heavy receipts and of low receipts their proper relative values.

Monthly prices of gum rosin were obtained by multiplying the average of the Wednesday and Saturday prices of each grade by the number of barrels of each grade reported as inspected in Florida during that month, and dividing the total of the resulting figures by the total number of barrels inspected in Florida during that month, thereby giving the proper relative value to each grade. The season average was determined in the same manner as was that of gum turpentine.

Prices, Florida inspections, and monthly receipts at Savannah, Jacksonville, and Pensacola are taken from the *Naval Stores Review and Journal of Trade*, Gamble's International Naval Stores Yearbook, and daily market reports of the Savannah Exchange. These statistics on the naval stores markets are prepared by the Economic Analysis Unit, General Crops Section, Agricultural Adjustment Administration.

Details of Carryover

Carryover (stocks) figures, on this page, do not include turpentine or rosin producible from crude gum or crude wood turpentine on hand. Probably, in but few instances are the figures for carryover, as well as for production, to be considered as complete and final. Reports on stocks and production are obtained at stills from each producer and on consumption and stocks from dealers and consumers.

Stocks of turpentine and rosin are separated into gum and wood products, but wood rosin data do not include, in this case, so-called "B wood rosin."

Details of Carryover (Stocks) March 31

	TURPENTINE				ROSIN			
	1939 Gum	1939 Wood	1938 Gum & wood	1937 Gum & wood	1939 Gum	1939 Wood	1938 Gum & wood	1937 Gum & wood
Gum stills[1]	16,858	.....	24,397	11,272	137,597	.....	211,545	50,847
Savannah[2]	37,639	.....	27,073	23,728	281,882	.....	67,039	43,633
Jacksonville[2]	44,454	.....	6,593	37,692	261,099	.....	57,656	47,299
Pensacola[2]	27,533	.....	22,635	14,980	65,107	.....	13,661	18,001
Other Sou. Ports.	63,114	.....	34,416	32,297	242,716	.....	61,689	72,436
Interior yards ...	49,270	.....	20,479	13,918	201,685	.....	10,545	33,364
Totals	222,010	.....	111,196	122,615	1,052,489	.....	210,590	214,733
Wood plants:								
Steam dist.[3] ...	.....	13,026	17,579	21,943	.....	152,042	162,572	47,059
Sulfate	.....	6,238	5,759	3,499	.....	5,201	4,400	.....
Destruc. dist. ..	.....	652	650	643	.....	.....	.....	.....
Totals	.....	19,916	23,988	26,085	.....	157,243	166,972	47,059
Distrib. points:								
Eastern	5,658	4,752	8,348	9,760	3,989	5,461	12,115	11,341
Central	13,224	8,767	26,902	19,201	6,081	2,615	14,236	8,429
Western	3,842	2,288	7,488	3,642	513	518	5,532	1,179
Totals[4]	22,724	15,807	42,738	32,603	10,583	8,594	31,883	20,949
Industrial plants[5]	11,066	5,942	16,455	30,789	198,455	57,009	378,357	329,663

Summary of Carryover (Stocks)

Gum stills	16,858	.....	24,397	11,272	137,597	.....	211,545	50,847
Sou. ports and int. yards	222,010	.....	111,196	122,615	1,052,489	.....	210,590	214,733
Wood plants	.....	19,916	23,988	26,085	.....	157,243	166,972	47,059
No. dist. points ..	22,724	15,807	42,738	32,603	10,583	8,594	31,883	20,949
Industrial plants .	11,066	5,942	16,455	30,789	198,455	57,009	378,357	329,663
Total in U. S.	272,658	41,665	218,774	223,364	1,399,124	222,846	999,347	663,251
At and afloat to London[6]	25,050		30,715	21,300				
Total U. S. and London	339,373		249,489	244,664				

[1] Compiled from reports by producers and factors. [2] Official Board of Trade and Chamber of Commerce reports. [3] Does not include by-products resulting from making pale grades from FF wood rosin. [4] Compiled from reports of individual distributors. [5] Compiled from reports of individual consumers. [6] April 5, 1937, and April 4, 1938, and April 3, 1939. Gum and Wood. Included because of the importance of its effect on the American market.

Data for the 1938-39 and previous two seasons will be completed in the December issue, including Details of Consumption, Exports, and Imports.

Foreign Production, Stocks and Exports[1]

Supplied by Chemical Division, Bureau of Foreign and Domestic Commerce, Dept. of Commerce

	TURPENTINE			ROSIN		
	1938	1937 (Bbls., 50 gals.)	1936	1938	1937 (Bbls., 500 lbs. gross)	1936
France						
Production ..	132,200	134,000	113,220	401,000	404,250	291,809
Stocks	31,120[2]	.....	9,180	99,750	.....	37,468
Exports	18,452[3]	12,717[4]	2,448	201,768[3]	167,500	163,559
Portugal						
Production ..	78,800[5]	48,890[6]	47,000[1]	257,000[5]	190,736[6]	165,000
Stocks	61,200[7]	16,524[9]	0	157,500[7]	.....	0
Exports	66,120[8]	40,251[6]	57,014	185,441[8]	127,150[6]	167,905
Greece						
Production ..	48,960[10]	31,800	28,704	90,000[10]	98,500	75,818
Stocks		7,650[7]	6,120	.....	12,600[7]	6,171
Exports	18,458[11]	24,553	19,278	72,345[11]	85,890	77,360
Mexico						
Production ..	8,000[4]	12,121	9,780	24,300[4]	33,527	28,890
Stocks	2,452[12]	990	600	4,625[12]	1,103	595
Exports	15,698[4]	15,906[7]	12,060	13,288[4]	49,911[7]	6,735
Russia						
Production ..	103,281	78,000[13]	178,500	260,600	312,000[13]	317,300
Stocks	.....	.....	.....	.....	.....	.....
Exports	.....	32,000[13]	48,200	.....	750[13]	1,300
India						
Production ..	12,750[8]	9,635	.....	34,300[8]	30,988	.....
Stocks	9,535[8]	.....	.....	15,931[8]	.....	.....
Exports	2,693[8]	2,500	.....	1,151[8]	5,700	.....

[1] Production and stocks are estimates based upon reports received from American Consuls and Commercial Attaches. Figures for '38 production and stocks are estimates subject to revision.
[2] January 1, '38.
[3] For 10 months (Apr. '38-Jan. '39).
[4] For 11 months (Apr. '37-Feb. '38).
[5] For 11 months (Jan-Nov. '38).
[6] For 10 months (Jan.-Oct. '37).
[7] Dec. 31, '38.
[8] Calendar year '38.
[9] Sept. 30, '37.
[10] 1938-'39 Season.
[11] May 1, '38-Jan. 31, '39.
[12] Feb. 28, '39.
[13] For 9 months (Jan.-Sept. '38).

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A Complete Check-List of Products, Chemicals, Process Industries

Agricultural Chemicals

Production a livestock feed, comprising the treatment of base feed with a sugar molasses syrup. No. 2,170,137. Hans Fattinger, Stadl at St. Ruprecht on the Raab, Styria, Austria.

Method and apparatus for dispersng and coating particles of dust with an adhesive No. 2,172,001 Alexander Gordon Galloway, Washington, D. C., to the free use of the People of the United States of America.

Process freezing fruits and vegetables by direct contact with a refrigerant solution. No. 2,172,418. Robert B. Taylor, near Knoxville, Tenn., to Tennessee Valley Authority, Wilson Dam, Ala.

Insecticidal composition for horticultural use, comprising light mineral oil spray containing a metallic soap of a high molecular weight organic acid, adapted to cause jelling of the mineral oil, in concentration to produce incipient gelation at atmospheric temperature. No. 2.171,598. William B. Parker, Placerville, Cal., to California Spray-Chemical Corp., Berkeley, Calif.

Preparation an insecticidal concentrate, comprising fixed oil, contact insecticide, volatile solvent for said insecticide, and emulsifier soluble in the concentrate. No. 2,172,689. Walter C. O'Kane, Durham, N. H., to Spray Base Corp., Jersey City, N. J.

Preparation an insecticidal spray, comprising plant spray mineral oil, contact insecticide, volatile solvent for the insecticide, and emulsifier soluble in the concentrate. No. 2,172,690. Walter C. O'Kane, Durham, N. H., to Spray Base Corp., Jersey City, N. J.

Herbicide, comprising 1 part by volume of furfural that has been saturated with ammonium thiocyanate, together with 1-20 parts of Diesel oil of sp. gr. 27-32° Bé. No. 2,173,236. Harold R. Offord, Berkeley, Calif., to the free use of the People of the United States.

Manufacture calcium metaphosphate fertilizer. Nos. 2,173,825-6. Harry A. Curtis, Knoxville, Tenn., and Roy C. Heaton, near Sheffield, Ala.

Cellulose

Manufacture a water-sensitive film of cellulosic nature, prepared from aqueous alkaline cellulose solution containing an organic softening agent to restrict the deformation of the film. No. 2,170,827. William Frederick Underwood, Buffalo, N. Y. and Henry S. Rothrock, Wilmington, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Manufacture a water-sensitive film, to be used as a wrapping tissue, comprising a cellulosic derivative treated with a softening agent, the latter being a high-boiling, hygroscopic ester-ether or ester-ketone. Nos. 2,170,839-40. Henry S. Rothrock, Wilmington, Del. to E. I. du Pont de Nemours & Co., Wilmington, Del.

Method treating alkali cellulose, comprising reacting same with monohalogen fatty acid and precipitating with aluminum the derivative so obtained; the precipitate is washed, and resolved by adding alkali to yield a water-soluble product of increased viscosity. No. 2,171,222. Georg Meyer, Hanover, Ger.

Production alkali-soluble cellulose ethers, comprising alkylating cellulosic material with a fixed excess of alkyating agent. No. 2,172,109. Frank H. Reichel and Walter F. Hindry, to Sylvania Industrial Corp., both of Fredericksburg, Va.

Preparation of cellulose ethers, wherein cellulose of viscosity of at least 20 centipoises is treated with a bath containing an acetal. No. 2,172,-242. Charles R. Fordyce and Joseph Gail Stampfli, to Eastman Kodak Co., all of Rochester, N. Y.

Production cellulose mixed organic esters, in which a principal reagent is chloracetic anhydride. No. 2,172,250. Carl J. Malm and Gordon D. Hiatt, to Eastman Kodak Co., all of Rochester, N. Y.

Extraction of saponin from vegetable matter by means of an appropriate organic solvent, anhydrous, in the presence of an alkaline compound. No. 2,172,265. Frederick H. Waltz, to Eastman Kodak Co., both of Rochester, N. Y.

Preparation a regenerated cellulose having relatively constant flexibility and softness, and having widely varying humidity by reason of containing a large proportion of sorbitol and a substantial proportion also of compounds of the tetra- and hexa-hydric alcohol series. No. 2,172,406. James T. Power, Wilmington, and Ernest G. Almy, Tamaqua, Pa., to Atlas Powder Co., Wilmington, Delaware.

Method increasing the reactivity of cellulose to esterification reagents, comprising pretreating cellulose with an alkali metal or ammonium salt, or an amine and substituted amine salts of a strong mineral acid, and then drying the treated cellulose to a moisture content of less than 12%. No. 2,172,447. Arnold Marschall, Freiburg-in-Breisgau, Germany, to E. I. du Pont de Nemours & Co., Wilmington, Del.

Process treating cellulosic material with alkylene oxide vapors in the presence of a tertiary amine catalyst, to produce hydroxy-alkyl cellulose. No. 2,173,470. Aubrey Ernest Broderick, South Charleston, W. Va., to Carbide and Carbon Chemicals Corp., a corp. of New York.

Process treating unmercerized cellulose of water content equal to 35-60% with gaseous alkylene oxide in the presence of a small amount of etherification catalyst, at a temperature between 20° and 60° C. No. 2,173,471. Aubrey Ernest Broderick, South Charleston, W. Va., to Carbide and Carbon Chemicals Corp., a corp. of New York.

Process manufacturing soda-cellulose, comprising dipping cellulose fiber sheet in water until saturated, then into caustic soda of about 18% strength, pressing the sheet to a predetermined soda content, and then converting same to a cellulose derivative. No. 2,174,894. George A. Richter and Kenneth E. Glidden, Berlin, N. H., to Brown Co., Berlin, N. H.

Production a partially esterified cellulose ester, comprising treating wood pulp with formic acid, then treating the product with a lower fatty acid in the presence of a catalyst, and with the desired anhydride to form a tri-substituted ester. No. 2,175,103. Ernst Berl, Pittsburgh, Pa.

Method treating cellulosic fiber in a circulatory alkaline soaking apparatus, and then treating similarly the material with an acid bath, and finally cooking at an elevated temperature. No. 2,175,154. Albert D. Merrill, to Chemipulp Process, Inc., both of Watertown, N. Y.

Process manufacturing alkaline cellulose from lignin-containing cellulosic materials. No. 2,175,257. Henry Dreyfus, London, England.

Chemical Specialty

Brake and pressure fluid, consisting of tetrahydrofurfuryl alcohol in mixture with material of the group consisting of primary aliphatic unsaturated alcohol having 18 carbon atoms in the molecule and cyclohexanone-glycerine, with or without an additional amount of high molecular alkyl amine. No. 2,171,491. Rudolf Endres, Dessau-Rosslau/Anhalt, Germany.

As a germicide, a bromo alkyl meta-diphenol. No. 2,171,494. Lucas P. Kyrides, Webster Groves, Mo., to Monsanto Chemical Co., a corp. of Del.

Manufacture a disabling liquid, comprising a non-poisonous, non-flammable, non-explosive alkaline ammonium carbonate base modified with essential oils. No. 2,171,701. Charles E. Howett, to Howett Laboratories, Inc., both of Lancaster, Pa.

A package of plastic material, comprising a stick of semi-rigid reversible, hydro-colloid latex, a flanged ring intermediate the ends of the stick, and end closures for same. No. 2,171,708. Clyde A. Nelson, Milford, Del.

Electric insulating composition, containing a mixture of chlorinated isopropyl benzenes of boiling range 260-310° C., and a diluent, the latter comprising a mixture of chlorinated isopropyl benzenes boiling in the range 250-260° C. No. 2,171,855. Arthur A. Levine and Oliver W. Cass, Niagara Falls, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Cigarette paper impregnated with a nitrogen compound from the group consisting of water-soluble amino acids, urea, urea nitrate, ammonium nitrate, and hexamethylenetetramine. No. 2,171,986. Paul Poetschke, Bronxville, N. Y.

A non-corrosive anti-freeze, being an alcohol containing an aromatic nitro carboxy compound. No. 2,172,075. Fred R. Whaley, Buffalo, N. Y., to Carbide and Carbon Chemicals Corp., a corp. of N. Y.

Massage cream, containing (among other ingredients) a fatty acid of high M. W. and the soap of a high M. W. fatty acid, compounded with a wax and volatile solvent. No. 2,172,118. Ida G. Blish, Washington, D. C.

Lubricant corrosive to a copper strip test, comprising a hydrocarbon oil and a sulfurized unsaturated fatty acid, said acid being obtained from wood oil. No. 2,172,285. Bert H. Lincoln and Waldo L. Steiner, to Continental Oil Co., both of Ponca City, Okla.

Humectant composition, being free of mannitol and alkali sulfate, and comprising a major amount of sorbitol, iditol, and talitol and a lesser quantity of branched chain desoxy hexitol or pentitol. No. 2,172,357. Kenneth Rent Brown, Tamaqua, Pa., to Atlas Powder Co., Wilmington, Del.

Low pour-point lubricant of high film strength, comprising a hydrocarbon oil and a small amount of a synthetic compound, the latter being the condensation product of a halogenated wax and an aromatic compound, formed in the presence of aluminum chloride. No. 2,172,382. Alfred Henriksen and Bert H. Lincoln, Ponca City, Okla., to The Lubri-Zol Development Corp., Cleveland, Ohio.

An insulating material, comprising fibrous sheet impregnated with a composition of a cellulose derivative and an oxidized abietic acid, having a sheet of cellulose derivative adhered to one face thereof to form a composite sheet. No. 2,172,445. Raymond P. Lutz, Oak Park, Ill., to Western Electric Co., Inc., New York City.

Composition for printing roller coverings, consisting essentially of saturated aqueous magnesium chloride (100 parts), wheat starch of low moisture content (95 parts), and a slightly drying oil (2-10 parts). No. 2,172,491. Gustave Auvray, Cachan, France.

Toothpaste composition, comprising an intimate mixture of sodium perborate and a viscous liquid vehicle including a large proportion of water-soluble boric acid ester of a polyhydric alcohol of the group consisting of the glycols and glycerine, said ester being inert to the perborate. No. 2,172,743. Thomas Ivan Taylor, New York City.

Liquid electric composition, comprising a mixture of isomers of tetrachlorodiphenyl sulfide. No. 2,172,954. Frank M. Clark, Pittsfield, Mass., to General Electric Co., a corp. of New York.

Soft-soldering composition for aluminum and its alloys with magnesium, comprising a complex salt containing a stannic halide and hydrohalide of a hydrogen-rich amine in combination with at least one stannous halide and one zinc halide. No. 2,172,979. Fritz Kohler, Eduard Rouette, and Wilhelm Standop, Bonn-on-the-Rhine, Germany.

Lubricant, comprising hydrocarbon oil and a small amount of a carboxylic acid ester of a hydroxy ether. No. 2,173,117. James W. Johnson, Jr., Philadelphia, Pa., to The Atlantic Refining Co., Philadelphia, Pa.

Vanishing cosmetic cream, containing a plastic emulsion of oleaginous material and aqueous material including a small amount of aliphatic compound having derivative groups with both hydro-and oleo-philic groups. No. 2,173,203. Benjamin R. Harris, Chicago, Ill.

Heat-producing composition, comprising a dry composition of alkali chlorate, powdered metal, and powdered metal oxide which mixture, when moistened with acqueous ammonium chloride, becomes heated. No. 2,173,-297. Myles Wade Fletcher, to Utility Sales Corp., both of Atlanta, Ga.

Insecticide, comprising a meta derivative of hydrazobenzene. No. 2,173,-386. Donald L. Vivian, Washington, D. C. to Henry A. Wallace, Secretary of Agriculture of the United States of America.

Heat-generating package for waving hair, said package containing aluminum metal or a metal more electropositive than aluminum, and a mercurous salt; when moistened with water-soluble ammonium salts, an exothermic reaction takes place. No. 2,173,683. Abraham R. Goldfarb, Bronx, and Edwin B. Michaels, Brooklyn, N. Y., to Lawrence Richard Bruce, Inc., a corp. of New York.

Insecticide, an aqueous solution of a soap of linseed oil fatty acids, and rotenone. No. 2,173,849. Tiffany Lind, Port Chester, N. Y., to Lin-Tox Corporation, a corp. of New York.

Gum confection, containing sugar and a chlorinated starch product. No. 2,173,878. Arthur D. Fuller, to National Adhesives Corp., both of New York City.

Synthetic froth flotation agent, being a condensation product of alkylolamine and a higher organic acid material. No. 2,173,909. Wolf Kritchevsky, to Ninol, Inc., both of Chicago. Ill.

Corrosion inhibited motor oil, comprising mineral lubricating oil and an organic phosphorus compound containing one divalent atom of oxygen, sulfur, or selenium. No. 2,174,019. Frederick W. Sullivan, Jr., Flossmoor, Ill., to Standard Oil Co., Chicago, Ill.

Plastic, cold-workable, waterproof dielectric compound, comprising a combination of coumarone-indene resin and chlorinated paraffine, together with a heavy solvent plasticizing oil and inert fillers. No. 2,174,164. Silvio Pellerano, Brooklyn, N. Y.

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Antifreeze compound, comprising ammonium chloride (1 part), sodium carbonate (1 part), water-miscible polyhydric alcohol (2-3 parts), and alkali metal hydroxide. No. 2,174,220. William R. Canfield, San Diego, Calif.

Improved lubricant, comprising mineral lubricating oil containing a stabilizing amount of a p,p'-dialky-diphenol polysulfide, the sulfur nucleus comprising from 2 to 4 S atoms. No. 2,174,248. Louis A. Mikesha, Westfield, and Eugene Lieber, Linden, N. J., to Standard Oil Development Co., a corp. of Del.

Fungicide, comprising hydrogenated, mixed petroleum-type aromatic compounds having an aniline point of about 20° F., to -80° F., and a gravity of 8° to 20° A. P. I. No. 2,174,258. Edward F. English and Alexis Voorhies, Jr., Baton Rouge, La., to Standard Oil Development Co., a corp. of Delaware.

Electric insulating liquid, comprising nuclear chlorinated ethylbenzene containing 3-5 chlorine atoms per mole and isopropylbenzene having 4.0-4.5 atoms of nuclear chlorine substituents per mole. No. 2,174,289. Arthur A. Levine and Oliver W. Cass, Niagara Falls, N Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Tetrachlorobenzotrifluoride, as a dielectric medium; compound has a dielectric constant of about 4.5 at 25°C., boils at 247-249° C., and has a viscosity at 37.8° C. of about 35 seconds. No. 2,174,512. Lee Cone Holt, Edgemoor, and Herbert Wilkens Daudt, to Kinetic Chemicals, Inc., all of Wilmington, Del.

Dielectric mixture, comprising a mixture of chlorobenzo-trifluorides boiling below 200° C., said mixture comprising a major fraction of dichlorobenzo-trifluoride. No. 2,174,513. Lee Cone Holt, Edgemoor, and Herbert Wilkens Daudt, to E. I. du Pont de Nemours & Co., all of Wilmington, Del.

Adhesive composition, comprising a solid solution of sucrose octa-acetate and invert sugar penta-acetates. No. 2,174,541. Victor Walthausen, Bronxville, and Lylla R. Metry, Brooklyn, N. Y.

Flux composition, comprising boric acid, alkali fluoride, alkali silicofluoride, and alkali borofluoride. No. 2,174,551. Lionel Cinamon and Samuel Sklarew, New York City, to Special Chemicals Corp., New York City.

Insecticide or rodent shell, comprising a mixture of granular material soaked in an inflammable medium with a vermin-destroying agent, and an explosive charge for propelling the mixture into places infested. No. 2,175,112. Albert C. Fischer, Chicago, Ill.

Insecticide, being a 9-chlorofluorene containing material. No. 2,175,109. Houston V. Claborn and Lloyd E. Smith, Washington, D. C.; dedicated to the free use of the People of the United States of America.

Froth flotation reagents, comprising polymethylene dinitriles having at least 6 carbon atoms in the molecule. No. 2,175,093. Anderson W. Ralston and William O. Pool, to Armour & Co., all of Chicago, Ill.

Metal-working lubricant, comprising a substantially neutral aqueous emulsion containing mineral oil and a palm oil soap. No. 2,174,907. Stanley P. Waugh, Westfield, N. J., three-fourths to Tide Water Associated Oil Co., New York City.

Plastic cement for solid carbon members, comprising a resinified furan of the group consisting of furfural, furfuryl alcohol, and mixtures thereof. No. 2,174,886. Edwin F. Kiefer, Cleveland, Ohio, to National Carbon Co. Inc., a corp. of New York.

Thermoadhesive composition, comprising a mixture of polyvinyl resin, shellac, and a fluxing resin of softening point lower than that of the polyvinyl resin; said mixture having a softening point of about 134° F. No. 2,174,885. Ernest L. Kallander, Framingham, Mass., to Dennison Manufacturing Co., Framingham, Mass.

Heat insulating material, comprising a non-heat conductive material admixed with finely divided silicon. No. 2,174,770. William S. Wilson, Brookline, Mass., to Monsanto Chemical Co., a corp. of Delaware.

Cosmetic composition preventing or reducing sunburn, comprising a vehicle having dispersed therein a flaked, light-weight metal powder. No. 2,175,213. Charles L. Parsons, one-half to Henry C. Parker, both of Washington, D. C.

Coal Tar Chemicals

Preparation an alkylated diphenyloxide having at least 18 carbon atoms in the molecule, of which at least 1 alkyl has at least 2 carbon atoms. No. 2,170,809. Gerald H. Coleman and Ralph P. Perkins, to The Dow Chemical Co., Midland, Mich.

Preparation a lower alkyl-halo-diphenyl-oxide containing at least one lower alkyl radical having at least 2 carbon atoms. No. 2,170,989. Gerald H. Coleman and Robert R. Dreisbach, to The Dow Chemical Co., Midland, Mich.

Preparation a 2-methallyl ether of a phenylphenol. No. 2,170,990. Gerald H. Coleman and Garnett V. Moore, to The Dow Chemical Co., Midland, Mich., a corp. of Mich.

Preparation of monoalkyl ethers of halogenated resorcinols. No. 2,171,495. Lucas P. Kyrides, Webster Groves, Mo., to Monsanto Chemical Co., a corp. of Del.

Preparation a stable solution in water of alpha-naphthol, comprising dispersing the naphthol with potassium soap, and ethyl and/or isopropyl alcohol, in water to make a concentrated solution remaining clear on standing. No. 2,171,555. Ferdinand Herb, to Arnold Joerns, both of Chicago, Ill.

Process alkylating diphenyl derivatives, comprising essentially direct alkylation with various aliphatic groups via the Friede-Crafts method. No. 2,172,391. Herbert J. Krase, Anniston, Ala., to Monsanto Chemical Co., St. Louis, Mo.

Cyclic process producing tar acids or phenol from tar oil or the like, comprising extraction of the latter crude materials with caustic soda, and then hydrolyzing the salts so formed with sodium bicarbonate; the caustic and alkali carbonate being derived electrolytically from aqueous sodium carbonate. No. 2,172,415. Hubert L. Stewart, Pittsburgh, Pa., to Koppers Co., a corp. of Delaware.

Process purifying light oils derived from coal tar, comprising essentially precipitating the sulfonates therein contained by adding and agitating the light oil with a low-boiling aliphatic hydrocarbon, and then wetting out with water the precipitate. No. 2,172,437. Frank W. Corkery, Crafton, Pa., to Pennsylvania Industrial Chemical Corp., a corp. of Pennsylvania.

Preparation 3-hydroxy-diphenylene oxides. No. 2,172,572. Karl Zahn and Kurt Schimmelschmidt, Frankfort-on-the-Main-Hochst, Germany, to General Aniline Works, Inc., New York City.

Process vacuum-distilling amines from gummy, metal-contaminated reaction products. No. 2,174,008. Harold G. Mow, Buffalo, N. Y., to National Aniline and Chemical Co., New York City.

Process manufacturing pitch, comprising essentially thermal decomposition of a tar suspension of pulverized coal. No. 2,174,184. Wilfred McKinley Bywater, Weehawken, N. J., to The Barrett Company, New York City.

Process separating phenols from impure solution, comprising precipitating the phenols with inorganic alkali under substantially anhydrous conditions. No. 2,174,532. Erwin Schwenk, Montclair, N. J., and Bradley Whitman, N. Y. City, to Schering Corp., Bloomfield, N. J.

Process reducing nitroaryl compounds with powdered iron and aqueous alkali, comprising continuously subjecting the reaction mass to attrition in a ball mill. No. 2,175,244. Harold George Bowlus, Penns Grove, and Walter Valentine Wirth, Woodstown, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Coatings

Transparent coating composition, containing gelatine and the reaction product formed by heating at 280° F. glycerine with an equivalent amount of phthalic anhydride. No. 21,195. Reissue. Charles M. Boyce, dec., late of High Park, New Brunswick, N. J., by John R. Ditmars, assignee, New Brunswick, N. J.

Protective, decorative coating, comprising polyhydric alcohol-polybasic acid resin containing the acid radical of an oil having drying properties, a natural resin, cellulose nitrate, plasticizer, pigment, and orthophosphoric acid in the amount of about 0.05-1.00%, said resins forming the predominant film-forming component. No. 2,170,658. Robert Tyler Hucks, South River, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation a coating for an electron discharge device, comprising covering with alumina monohydrate (to a depth of at least 0.005 in.) the cooperating electrode surfaces. No. 2,171,230. Delos H. Wamsley, West Caldwell, N. J., to Radio Corp. of America, New York, N. Y. a corp. of Del.

Method for coating flexible surfaces with lacquer, comprising applying a priming coat containing a large quantity of fillers and rubber as the only binder, to form one layer, and then adding at least two intermediate layers consisting of a mixture of a rubber dispersion, a polymerized acrylate ester, and a cellulose ether emulsion. No. 2,171,389. Steven Jan Blaupot ten Cate, Kootwijk Netherlands.

Method forming a protective coating on aluminum comprising etching with a hydrochloric acid solution of one of the metals of the iron group, then treating surface with chromic acid solution, and finally applying a paint film. No. 2,171,545. Junius D. Edwards, Oakmont, and Ralph B. Mason, New Kensington, Pa., to Aluminum Co. of America, a corp. of Pennsylvania.

Method priming aluminum surfaces prior to coating thereon, comprising treating the surface with alkali metal carbonate-chromate solution, and then washing the treated surface with aqueous nitric or chromic acid. No. 2,171,546. Walter R. Kappes, Oakmont, Pa., to Aluminum Co. of America, Pittsburgh, Pa.

Method bright-plating zinc, comprising adding polyvinyl alcohol to the plating solution, adding up to 1 gm. per liter of the alcohol. No. 2,171,842. Harold J. Barrett and Christian J. Wernlund, Niagara Falls, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation protective coating composition, comprising polymerization of liquid unsaturated hydrocarbons, or liquid chlorinated unsaturated hydrocarbons, or linseed oil, pigment and thinner, and an ammonium halide as polymerizing catalyst. No. 2,171,851. Herman B. Kipper, Accord, Mass.

Method increasing resistance of stainless steel to saline corrosion, comprising forming on the steel surface a thin film of insoluble chloride of a metal contained in the alloy. No. 2,172,388. Albert L. Kaye, Hammond, Ind., and Robert S. Williams, Belmont, and John C. Wulff, Cambridge, Mass., to The Chemical Foundation, Inc., New York City.

Method dressing metal, comprising treating the surface with a preparation containing an organic sulfonic acid substantially devoid of mineral acid content. No. 2,172,533. Michael W. Freeman, Detroit, Mich.

Coating method for preserving cheese to inhibit mold growth and loss of moisture, comprising immersing the cheese in an alkaline solution at 190° F. until the cheese surface has acquired an alkali caseinate coating which, when dry, prevents fat from sweating out through it. No. 2,172,781. Ronald Wood, Chicago, Ill.

Coating composition from castor oil, comprising substantially solidified castor oil insoluble in ether, alcohol, acetone, benzol, carbon disulfide, water, and turpentine, and sufficient alkali ricinoleate to form an emulsion when diluted with water. No. 2,172,955. Ivor M. Colbeth, East Orange, N. J., to The Baker Castor Oil Co., New York City.

Method bodying tung oil, comprising heating the oil to about 540° F. and, before gelation occurs, suddenly cooling below 350° F., in the absence of resin. No. 2,172,974. Leander H. Hills, Worcester, Mass., to The Vellumoid Co., Boston, Mass.

Preparation a paint mix, comprising vehicle, pigment, and a pigment extender, the last comprising non-catalyzed and non-dissociated calcium sulfate; when applied, the paint forms a toughened film. No. 2,172,997. Robert Seaver Edwards, Milton, Mass., to Rumford Chemical Works, Rumford, R. I.

Preparation a coating for vacuum tubes, comprising oxides of barium and beryllium impregnated upon a core of refractory material capable of reducing the barium oxide and serving as a source of barium metal within the vacuum tube. No. 2,173,258. Ernest A. Lederer, Essex Fells, N. J., to Radio Corp. of America, New York City.

Preparation a pigmented resin base, comprising a ground mixture of a pigment with a solid, plastic, water-insoluble resin and a stable, soluble organic polyamine, the last being a dispersing agent for the pigment. No. 2,173,430. Max Raymond Vogel, Easton, Pa., to Binney and Smith Co., New York City.

Preparation a carbon black pigmented cellulose ether base comprising carbon black ground with a plasticized cellulose ether and a nickel soap dispersant. No. 2,173,444. Robert Louis Zapp, Easton, Pa., to Binney and Smith Co., New York City.

Preparation a pigmented cellulose ether base comprising a pigment uniformly distributed in a cellulose ether, together with plasticizer and dispersant, the last being a soap of calcium, barium, or strontium. No. 2,173,445. Robert Louis Zapp, Easton, Pa., to Binney and Smith Co., New York City.

Manufacture a dry, powdered casein paint. No. 2,174,094. Joseph Vincent Reardon, to The Reardon Co., both of St. Louis, Mo.

Manufacture a varnish containing a phenolformaldehyde resin yielding a tough, resistant finish on wood. No. 2,174,132. Wilhelm Otto Maisch, Stuttgart, Germany, to Hermann Frenkel, Molkau, near Leipzig, Germany.

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Method removing porcelain enamel from a surface, comprising subjecting the enameled surface to a solution of about equal parts hydrofluoric and sulfuric acids at 20-30° C. No. 2,174,454. Max Zimmermann and Werner Funke, Leverkusen-Wiesdorf, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Method rendering stainless steel impervious to action of active chlorine, comprising pretreating the stainless steel surface with a persulfate at an elevated temperature. No. 2,174,516. Hans O. Kauffmann and Robert L. McEwen, to Buffalo Electro-Chemical Co. Inc., all of Buffalo, N. Y.

Dyes, Stains, Etc.

Manufacture an azo dyestuff of the structure $RCOC_6H_4N{=}NR'$, where R is a heterocyclic nucleus of the group consisting of pyrrole, thiophene, and furane, and R′ an aromatic nucleus. No. 2,171,159. James G. McNally, Joseph B. Dickey and Werner H. Zugschwerdt, to Eastman Kodak Co., Rochester, N. Y., a corp. of N. J.

Preparation a polyazo dyestuff, one of the principal nuclei being a disulfonated periazo-naphthol. No. 2,171,364. Chester W. Hannum and Swanie S. Rossander, Wilmington, Del., to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Preparation an azo dyestuff from a derivative of completely diazotised phenylene diamine. No. 2,171,824. Gerald Bonhote and Hans Johner, Basel, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Preparation a chromiferous dyestuff from a monoazo-compound coupled with alpha-naphthylamine-4,8-disulfonic acid. No. 2,171,828. Walter Hanhart, Riehen, near Basel, and Peter Pieth, to Society of Chemical Industry in Basle, Basel, Switzerland.

Preparation complex metal compounds obtained from the product produced by coupling 1-hydroxy-4-nitro-8-sulfonic-naphthylamine with a beta-naphthol. No. 2,171,838. Fritz Straub and Peter Pieth, Basel, and Hermann Schneider, Riehen, Switzerland, to Soc. of Chemical Industry in Basle, Basel, Switzerland.

Preparation a stabilized diazo salt paste. No. 2,171,976. Wallace A. Erickson, Woodstown, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation an azo dyestuff, comprising essentially a meta- or para-phenylene diamine nucleus joined with several complex aryl compounds; dye yields on vegetable fiber orange to red shades of good dischargeability, both in neutral and alkaline processes. No. 2,172,691. Hans Roos, Leverkusen-I. G. Werk, Germany, to General Aniline Works, Inc., New York City.

Manufacture azo dyestuffs from a meta- or para-phenylene diamine base and having several complex aryl substituents; dye yields on vegetable fiber yellow to red shades of good dischargeability in both neutral and alkaline processes. No. 2,172,712. Hans Roos, Leverkusen-I. G.-Werk, Germany, to General Aniline Works, New York City.

Preparation an azo dyestuff from a substituted benzidine. No. 2,172,752. Donovan E. Kvalnes, Carneys Point, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation a disazo dyestuff from a benzidine nucleus which, when impregnated on the fiber, is developed with beta-naphthol-3-carboxylic acid. No. 2,172,753. Donovan E. Kvalnes, Penns Grove, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation an anthraquinone acid wool dyestuff, being of the class consisting of 1-amino-2-methyl-4-(2′-methoxy-5′-methyl-anilido)-anthraquinonesulfonic acids. No. 2,172,763. Henry R. Lee, South Milwaukee, Wis., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation monoazo dyestuffs for cellulose esters and ethers. Nos. 2,173,052-56. Emmet F. Hitch and Swanie S. Rossander, Wilmington, Del., and Donovan E. Kvalnes, Penns Grove, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation diazoamino compounds having a heterocyclic nucleus of 5 members containing a sulfur atom of valence 6. No. 2,173,324. Albert Schmelzer, Cologne, and Eberhard Stein, Leverkusen-Schlebusch, Germany, to General Aniline Works, Inc., New York City.

Production azo dyestuffs, yielding on wool after chroming, from an acid bath, green shades fast to fulling, potting, and light; dyestuff being ortho-aminophenol diazotized and coupled with beta-naphthylamine-3-carboxy-6-sulfonic acid. No. 2,173,410. Achille Conzetti and Abram Oulevay, to J. R. Geigy A. G., both of Basel, Switzerland.

Preparation an azo dyestuff from an orthocyano-para-nitro-aniline. No. 2,173,417. Wilhelm Huber, to Society of Chemical Industry in Basle, both of Basel, Switzerland.

Preparation a photographic dye, being a benzoxazole-trimethinecyanine. No. 2,173,486. Willhelm Schneider, Dessau, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Preparation alkyl derivatives of hexahyahydrobenzothiazoles and hexahydrobenzoselenazoles, said derivatives being in the 2-position. No. 2,173,491. Walter Zeh, Wolfen, Kreis Bitterfeld, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Preparation a thioindigo dyestuff by oxidizing a thio-indoxyl compound with isopropyl naphthalene alkali sulfonate as a catalytic agent. No. 2,173,506. John Elton Cole, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Dye composition for printing containing vat dye, benzyl alcohol, and a sulfonated oil. No. 2,173,824. Ivan F. Chambers, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Preparation an azo dyestuff, by coupling meta-nitro-para-anisidine with beta-naphthol. No. 2,173,920. Alfred Siegel, Roselle, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Vat printing paste containing also acetaldol. No. 2,174,005. Charles Franklin Miller, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Manufacture an anthraquinone oxazole dyestuff. No. 2,174,072. Georg Kranzlein, Frankfort-on-the-Main and Hans Schlichenmaier, Kelkheim in Taunus, Germany, to General Aniline Works, Inc., New York City.

Manufacture vat dyestuffs of the phthaloylcarbazole series, substituted by trifluormethyl groups; said dyestuffs yielding tints of good fastness. No. 2,174,182. Hans Schlichenmaier, Frankfort-on-the-Main, Hans Hoyer, Leverkusen, and Ludwig Wilhelm, Berlin, Frankfort-on-the-Main, Germany, to General Aniline Works, Inc., New York City.

Process developing vat dyes on the fabric, by a continuous steaming process. No. 2,174,227. Albert S. Jones, to Arnold Print Works, both of North Adams, Mass.

Preparation a dye intermediate, comprising a polymethylene glycol monoamide of 1-anthraquinone-2-carboxylic acid. No. 2,174,245. Artur Krause and Robert Zell, Ludwigshafen-on-the-Rhine, Germany, to General Aniline Works, Inc., New York City.

Method of dyeing fabrics with vat dyestuffs in an alkaline bath of the leuco form. No. 2,174,372. Cornelis Warnardus Zahn, Helmond, Netherlands, to J. A. Carp's Garenfabrieken N. V., Helmond, Netherlands.

Preparation a printing composition, comprising textile printing paste containing also an organic penetrating agent. No. 2,174,486. Ivan F. Chambers, Wilmington, Del., and Arthur L. Fox, Woodstown, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Manufacture metal-containing dyestuffs, comprising reacting benzene meta-diamines with one mole of diazotized ortho-amino-para-sulfosalicylic acid and one mole of diazotized primary aryl amine. No. 2,174,591. Mordecai Mendoza, Blackley, Manchester, England, to Imperial Chemical Industries, Ltd., a corp. of Great Britain.

Preparation of peri-naphthindenone compounds. No. 2,174,751. Karl Koeberle, Werner Rohland, and Christian Stiegerwald, Ludwigshafen-on-the-Rhine, Germany, to General Aniline Works, Inc., New York City.

Preparation a chromiferous dyestuff, comprising treating with a chromium compound an aralkyl derivative of anthraquinone-2-sulfonic acid-1,4-diamine. No. 2,174,823. Erich Fischer, Bad Soden in Taunus, Germany, to General Aniline Works, Inc., New York City.

Manufacture a dye intermediate, comprising a ring-acylated dibasic phenol coupled with two primary aryl amines, one linkage being ortho to a phenolic group, the other ortho to the acyl group. No. 2,174,998. Swanie S. Rossander, Wilmington, Del., and Harold E. Woodward, Penns Grove, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Method preparing hexahydro-paraphenylene diamine, by saturating with hydrogen the liquid amine, at elevated temperature and pressure, in the presence of nickel or cobalt catalyst. No. 2,175,003. Caryl Sly, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Penetrating wood stain and preservative compound, comprising 5 parts crude pine gum, 7 parts dehydrated tar (pine oil free), and 9 parts distilled pine oil as a penetrating solvent for both tar and gum. No. 2,175,115. Percy L. Gardner, Patrick, S. C.

Production vat dyestuffs of the fluoranthrene quinone series. No. 2,175,122. Walter Kern, Sissach, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Production of triarylmethane carboxylic acid derivatives, as chromable dyestuffs. No. 2,175,168. Wilhelm Eckert and Karl Schilling, Frankfort-on-the-Main-Hochst, Germany, to General Aniline Works, Inc., New York City.

Preparation azo dyestuffs containing copper in a complex form, said dyestuffs being meta-phenylene diamine compounds. No. 2,175,187. Ernst Fellmer, Leverkusen-I. G. Werk, Germany, to General Aniline Works, Inc., New York City.

Explosives

Preparation an explosive composition containing an organic tetrazylazide. No. 2,170,943. Walter Friederich, Troisdorf, Cologne, Ger., to Dynamite-Aktiengesellschaft, vormals Alfred Nobel & Co., Troisdorf, nr. Cologne-on-the-Rhine, Ger.

Manufacture a granular, detonating explosive, especially adapted for coal mining, comprising an ammonium nitrate conglomerate, containing a binding agent and a sensitizing agent, of such size that the particles are all held on a 50-mesh screen. No. 2,171,379. Milton Heins Wahl, Woodbury, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Manufacture a low-density, porous ammonium nitrate. No. 2,174,238. William B. Gideon, Du Pont, Wash., and Thorvald W. Hauff, Woodbury, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation an explosive composition, containing sulfur, charcoal, and nitrated balsa wood, impregnated with a mixture containing a major amount of sodium nitrate and a smaller amount of ammonium nitrate. No. 2,174,914. Willard de C. Crater, Newark, Del., to Hercules Powder Co., Wilmington, Del.

Method treating smokeless powder containing deteriorated nitro-cellulose, comprising softening the nitro-cellulose with a solvent therefor which is immiscible with water, and washing the solution in water. No. 2,175,212. Fredrich Olsen, Gordon C. Tibbitts and Edward B. W. Kerone, Alton, Ill., to Western Cartridge Co., East Alton, Ill.

Ignition charge for an electric blasting initiator, comprising a bead of a complex salt of lead nitrate with a lead salt of a nitrophenol, said bead surrounding the electric bridge within the blasting cap. No. 2,175,249. Lawton Arthur Burrows, Wenonah, and William Frederick Filbert, Woodbury, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Fine Chemicals

Method dehydrating aqueous solutions of lower aliphatic acids, comprising azeotropic distillation in the presence of an alcoholized entraining agent. Nos. 2,171,549-50. Jack J. Gordon and Arthur W. Bright, Kingsport, Tenn., to Eastman Kodak Co., Jersey City, N. J.

Method toning silver photographic prints, where the silver image is partly replaced with one of cadmium sulfide. No. 2,171,609. Francis H. Snyder and Henry W. Rimbach, New York City, to Technico, Inc., a corp. of Delaware.

Preparation unsaturated aliphatic aldehydes, comprising oxidizing the corresponding unsaturated alcohol with selenium dioxide or selenous acid. No. 2,171,727. Carl T. Kautter, Darmstadt, Germany, to Rohm & Haas Co., Philadelphia, Pa.

Method determining the quantity of basic impurities in gaseous trimethylamine. No. 2,171,809. Le Roy U. Spence, Cheltenham, Pa., to Rohm & Haas Co., Philadelphia, Pa.

Preparation sodium derivatives of organic compounds by reacting with an organic compound an alkali metal addition compound of a polycyclic aromatic hydrocarbon, in an activating solvent. No. 2,171,867. Norman D. Scott, Sanborn, and Virgil L. Hansley and Joseph Frederic Walker, Niagara Falls, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Method reacting an acetylene compound with a solution of an alkali metal addition compound of a polycyclic aromatic hydrocarbon. No. 2,171,868. Norman D. Scott, Sanborn, and Joseph F. Walker, Niagara Falls, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Process, in which is reacted an alkali metal addition compound of a polycyclic aromatic hydrocarbon with an aliphatic nitrile. No. 2,171,869.

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Norman D. Scott, Sanborn, and Joseph Frederic Walker, Niagara Falls, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Method reacting an alkali metal addition compound of a polycyclic aromatic hydrocarbon with an organic carboxy compound having an alpha-hydrogen. No. 2,171,871. Joseph Frederic Walker, Niagara Falls, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation a light-sensitive antihalation layer for the photographic reversal process, including finely-divided silver sulfide suspended in a water-permeable binding agent. No. 2,171,911. Olaf Frederick Bloch, Ilford, Eng., to Ilford Limited, Ilford, Essex, England.

Preparation carboxylic acids of the cyclopentane-polyhydrophenanthrene series. No. 2,171,959. Max Bockmuhl, Gustav Ehrhart and Heinrich Ruschig, Frankfort-on-the-Main-Hochst, Germany, to Winthrop Chemical Co., Inc., New York City.

Method of testing for blood sugar, wherein formaldehyde is reduced to formose, the latter being determined with 2,4-dinitro-1-naphthol-7-sulfonic acid. No. 2,171,961. William B. Fortune, to Eli Lilly & Co., both of Indianapolis, Ind.

Method testing for urine albumin, wherein the analytical reagent is sodium hexametaphosphate. No. 2,171,962. William B. Fortune, to Eli Lilly & Co., both of Indianapolis, Ind.

Process reducing cyclic carbonyl compounds to the corresponding hydrocarbon, comprising essentially reduction with zinc dust and zinc chloride. No. 2,172.020. Erich Clar, Herrnskretschen, Czechoslovakia, to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation sulfonated sulfur-bearing mineral oils which retain their original sulfur content, being of light yellow-brown color and clearly soluble in water. No. 2,172,149. Erich Arnold Wernicke, Hamburg, Germany, to The Ichthyol Co., Rahway, N. J.

Process desensitizing light-sensitive silver halide emulsions, comprising treating with aqueous solution of a compound from the group including ethers and thioethers, which compounds are linked on one side to an anthraquinone and, on the other, a sulfonated organic radical. No. 2,172,192. Walter Dieterle, Dessau-Ziebigk, and Sebastian Gassner, Leverkusen, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Photographic developer, comprising such an agent, an effective amount of an alkali metal salt of an acid of the group including meta- and pyrophosphoric acids, and of an aliphatic nitrogen-containing polybasic acid. No. 2,172,216. Alfred Miller, Dessau, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Method producing alkali metal hyposulfites, by reduction of heavy metal hyposulfites with alkali metal amalgam. No. 2,172,275. Heinrich Dehnert, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Method preparing a pH comparator with a particular indicator dye having various color and intensity transmission characteristics. No. 2,172,352. Donald K. Allison, Beverly Hills, Calif., to National Technical Laboratories, Pasadena, Calif.

Method concentrating whey, by boiling its aqueous solution, and withdrawing portions of the concentrated solution while still boiling, and causing the latter to be suddenly heated and then cooled, thereby greatly hastening evaporation. No. 2,172,393. Charles O. Lavett, to the Buffalo Foundry & Machine Co., both of Buffalo, N. Y.

Process separating and purifying homologuous saturated and unsaturated carbonyl compounds of the sterol family. No. 2,172,590. Karl Miescher, Riehen, and Werner Fischer, Basel, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Preparation of benzyl-oxyalkyl aromatic sulfonates. No. 2,172,606. Courtland L. Butler and Leonard H. Cretcher, Pittsburgh, Pa., to Mellon Institute of Industrial Research, a corp. of Pennsylvania.

Preparation of 1-benzyloxy-2-propyl-apocupreine. No. 2,172.607. Courtland L. Butler, Alice G. Renfrew, and Leonard H. Cretcher, Pittsburgh, Pa., to Mellon Institute of Industrial Research, a corp. of Penn.

Preparation of a hydroxyalkyl ether of a cinchona alkaloid, namely a benzyloxyalkyl ether of a phenolic-hydroxyl-group containing cinchona alkaloid, which has been hydrolyzed in dil. HCl to yield the corresponding hydroxyalkyl compound. No. 2,172,608. Courtland L. Butler, Bennington, Vt., and Alice G. Renfrew and Leonard H. Cretcher, Pittsburgh, Pa., to Mellon Institute of Industrial Research, a corp. of Penn.

Preparation heavy metal compounds of sulfhydryl keratinic acid, containing about twice as much metal as the sulfhydryl groups are capable of binding. No. 2,172,717. Ernst Sturm, Berlin-Lankwitz and Richard Fleischmann, Berlin-Charlottenburg, Germany, to Chemische Fabrik Johann a-Wulfing, Berlin, Germany.

Preparation polycarboxylic acid esters of the alpha-ketol type. No. 2,172,803. Russell McGill, Arden, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation an ester, comprising triethanolamine one of whose hydroxyl groups is substituted by a higher fatty acid radical. No. 2,173,058. Wolf Kritchevsky, Chicago, Ill.

Preparation the chloro- and bromo-derivatives of vinyl methyl ketones, the halogen being in the alpha-position. No. 2,173,066. Lothar Walter Metzger, Cologne-Deutz, and Otto Bayer, Leverkusen-I. G. Werk, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Cyclic process for crystalline thiourea, compressing synthesizing thiourea in the presence of a thiourea solution, and cooling the reaction mixture to recover the crystallizing thiourea, then returning the mother liquor to the reaction vessel. No. 2,173,067. Richard O. Roblin Jr., Old Greenwich, Conn., to American Cyanamid Co., New York City.

Preparation quaternary ammonium bases by reacting an alkylene oxide, in a solution of pH equal to 8 or 9, with a hydroxy-alkyl derivative of a heterocyclic amine, the hydroxy-alkyl being the third substituent of the nitrogen atom in the heterocyclic ring. No. 2,173,069. Heinrich Ulrich and Ernst Ploetz, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Preparation a sexual hormone for internal administration, comprising treating one of the keto-forms of the hormone with an aliphatic carboxylic acid, hydroxy-carboxylic acid, or alcohol. No. 2,173,337. Karl Miescher, Riehen, and Albert Wettstein, Basel, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Preparation a gonad-stimulating product derived from the placenta of a pregnant mare. No. 2,173,353. Hubert R. Catchpole and William R. Lyons, Berkeley, Calif.; said Lyons to said Catchpole.

Preparation of carbonic acid derivatives of saturated and unsaturated androstane-ol-ones. No. 2,173,423. Karl Miescher, Richen, and Hans Kaegi, to Society of Chemical Industry in Basle, all of Basel, Switzerland.

Preparation of the mono-formate of androstenediol. No. 2,173,425. Leopold Ruzicka, Zurich, and Albert Wettstein and Hans Kaegi, Basel, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Preparation higher acyl derivatives of alkylolamines, being light-colored and substantially odorless. No. 2,173,448. Morris B. Katzman and Albert K. Epstein, Chicago, Ill.; said Katzman to The Emulso Corp., Chicago, Ill.

Preparation a fog-inhibitor for silver halide photographic emulsions, comprising derivatives of 2-amino-4-hydroxy-pyrimidine. No. 2,173,628. John David Kendall, Ilford, Eng., to Ilford Limited, Ilford, Essex, England.

Method extracting and concentrating vitamins A and D from natural substances, and obtaining said vitamins in substantially pure, crystalline form. No. 2,173,629. Nicholas A. Milas, Belmont, Mass., to Research Corp., of New York.

Manufacture a non-corrosive anti-freeze, being an alcohol having dissolved therein a small amount of inhibitor, being a soluble nitrite and an alkali metal salt of an unsaturated organic acid. No. 2,173,689. Headlee Lamprey, Buffalo, N. Y., to Carbide and Carbon Chemicals Corp., a corp. of New York.

Method producing fine-grained photographic images, on silver halide emulsion film containing also a dye coupling component and developing agent. No. 2,173,739. John R. Weber, South River, N. J., to du Pont Film Manufacturing Corp., New York City.

Preparation a nail enamel, being an organic cellulose ester (10 parts) dissolved in a solvent consisting of ethylene dichloride (25 parts) and diethylene oxide (40 parts). No. 2,173,755. Henry C. Fuller, Washington, D. C.

Production complex metal amine salts, comprising reacting a hydrocarbon halide, ammonium hydroxide, and a hydroxide of a Werner complex-forming metal. No. 2,173,823. Frederick C. Bersworth, Verona, N. J., to The Martin Dennis Co., Newark, N. J.

Preparation an acid addition compound of an alkyl thio-substituted benzoic acid ester of a dialkyl amine alkanol. No. 2,173,827. John Joseph Donleavy, Hamden, Conn., to Pitman-Moore Co., Indianapolis, Ind.

Preparation crystalline basic nitrate of mercuriated nitrophenol. No. 2,173,845. Josef Kathol, to Schering-Kahlbaum A. G., both of Berlin, Germany.

Preparation a detergent composition, comprising reacting an aromatic hydrocarbon with a vapor mixture of a halogen and a dioxide of sulfur, selenium or tellurium. Nos. 2,174,110-1. Cortes F. Reed, Anoka, Minn., ½ to Chas. L. Horn, Minneapolis, Minn.

Manufacture cyclic organic compounds, by closing a suitable open-chain compound with conc. hydrofluoric acid. No. 2,174,118. William S. Calcott, Woodstown, and John M. Tinker, Penns Grove, N. J., and Adrian L. Linch, Wilmington, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Manufacture an adsorbent agent, consisting in mixing aqueous sodium silicate with an aqueous acid aluminum salt, to form a gelatinous precipitate, and drying such that a dense gel does not set. No. 2,174,177. Henry R. Kraybill, Pearl H. Brewer, and Max Horsley Thornton, West Lafayette, Ind., to Purdue Research Foundation, West Lafayette, Ind.

Preparation of 2-amino-2-alkyl-propyl alcohol, where the alkyl group is ethyl or propyl. No. 2,174,242. Henry B. Hass, W. Lafayette, and Byron M. Vanderbilt, Terre Haute, Ind., to Purdue Research Foundation, La Fayette, Ind.

Method of purifying ethers, comprising contacting with an alkali metal derivative of a polycyclic aromatic compound. No. 2,174,293. Norman D. Scott, Sanborn, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Manufacture of gold derivatives of disulfide-acylalkylglucamides, being water-soluble yellow powders insoluble in ether. No. 2,174,412. Max Bockmuhl and Gustav Ehrhart, Frankfort-on-the-Main-Hochst, Germany, to Winthrop Chemical Co., Inc., New York City.

Preparation a sensitive photographic print coating, comprising adding to a polymerized polyvinyl alcohol a small amount of catalyst rendering said alcohol less soluble in the presence of actinic rays. No. 2,174,629. Anton F. Greiner, Detroit, Mich.

Pharmaceutical composition, comprising metadihydroxybenzene heated with an equal quantity of gum camphor. No. 2,174,976. Meyer S. Glauser, Philadelphia, Pa.

Glass

Treatment of glass batches in the molten state, comprising the addition to the melt of an inorganic cyanogen of the group consisting of the metal cyanides, cyanates, and cyanamides. No. 2,174,517. Frederick L. Koethen, Niagara Falls, N. Y., and Ignatius J. Wernert, Akron, Ohio, to E. I. du Pont de Nemours & Co., Wilmington, Del.

Manufacture a ruby glass, comprising preparing a glass melt to which is added a copper compound and a metallic cyanogen compound from the group consisting of metal cyanides, cyanates, and cyanamides. No. 2,174,554. Frank J. Dobrovolny, Ransomville, John M. Youel, Lewiston, and Harold E. Klein, Niagara Falls, to E. I. du Pont de Nemours & Co., Wilmington, Del.

Industrial Chemicals

Process recovering sulfur dioxide by absorption in aqueous ferrous sulfate, with production of sulfuric acid. No. 21,215. Reissue. Harmon E. Keyes, Phoenix, Ariz.

Manufacture concentrated, aqueous ammonium nitrate. No. 21,217. Reissue. Giacomo Fauser, Novara, Italy, to Montecatini, Societa Generale per l'Industria Mineraria ed Agricola, Milan, Italy.

Method preserving fish livers, comprising cooking them and mixing with 1-8% of an undissolved compound of the group consisting of boric acid and borax. No. 2,171,594. Ferdinand W. Nitardy, Brooklyn, N. Y., to E. R. Squibb & Sons, New York City.

Method removing fat from animal casings. No. 2,171,611. Lucius M. Tolman and Lloyd E. Dimond, Chicago, Ill., to Wilson & Co., a corp. of Delaware.

Method for treating gases and liquids, comprising passing a gas through a high-tension electric field maintained between opposed electrodes, and projecting a stream of liquid particles into said gas, adjacent to said electrode. No. 2,171,617. Harry A. Wintermute, Plainfield, N. J., to Research Corporation, New York City.

Production a modified starch, comprising mixing a potato, tapioca or sago starch of high moisure content with a small amount of alkaline salt, and rolling between heated rolls to increase the solubles to 30-65%.

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No. 2,171,796. Alfred H. Kelling, Oak Park, Ill., to Corn Products Refining Co., New York City.

Method reducing kieserite, comprising mixing with a metallic oxide or sulfide, and reducing with hydrogen or hydrogen sulfide, the products being magnesia and a single reduction compound of the SO_3 radical. No. 2,171,966. Hans Zirngibl, Bitterfeld, and Robert Griessbach, Wolfen, kreis Bitterfeld, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Method manufacturing ethylene oxide by oxidation, in the vapor phase, of ethylene, and then recovering the oxide by adsorption on activated carbon. No. 2,172,025. Herbert Langwell, Epsom, and Herbert Muggleton Stanley, Tadworth, England, to The Distillers Co., Ltd., Edinburgh, Scotland.

Process concentrating sulfuric acid, starting with 94% acid, which is passed through a tube at such a rate that heating to a proper temperature yields an acid concentration of about 98% on leaving the heated tube. No. 2,172,058. Willi Busching, Dolau-Halle, Germany.

Manufacture chlorine dioxide, comprising heating aqueous manganese chlorate to 50-90° C. while passing through the solution an inert gas to remove the dioxide as rapidly as formed. No. 2,172,434. George Lewis Cunningham, Niagara Falls, N. Y., to The Mathieson Alkali Works, Inc., New York, City.

Process improving margarine. No. 2,172,531. Willy Ekhard, Berlin-Pankow, Germany.

Process making alkyl halides, comprising vapor-phase reaction of lower alkanols with an aliphatic hydrocarbon having at least 3 halogen substituents in the molecule, in the presence of an activating catalyst at 200-350° C. No. 2,172,568. Friedrich Rothweiler. Hofheim in Taunus, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Process making concentrated sulfuric acid by the contact process. No. 2,172,617. Carl ten Doornkaat Koolman, Wolfhart Siecke, and Max Wohlwill, Frankfort-on-the-Main, Germany, to American Lurgi Corp., New York City.

Method of mining minerals, comprising circulating molten sulfur through an ore deposit, and treating the sulfur, as recovered, to separate the minerals entrained therein. No. 2,172,683. Howard L. Reed, Houston, Tex., one-third per cent. to Fohs Oil Company.

Continuous process for hydrocarbon-free water gas prepared from distillable solid fuel. No. 2,172,740. Willy Linder, Essen-Bredeney, Germany, to Koppers Company, Pittsburgh, Pa.

Preparation an insulating material from magnesia, comprising pressing wet, freshly prepared magnesium carbonate suspension including a small amount of water-soluble soap, and heating the material in the mold to convert the wet carbonate to a basic, shape-retaining, magnesium carbonate. No. 2,172,861. Earle R. Williams, North Plainfield, N. J., to Johns-Manville Corp., New York City.

Production of starch solutions, comprising heating aqueous starch with persulfate, the latter being in such small amount that any acidity produced by it is neutralized by traces of alkaline-reacting substances usually present in starch and undistilled water. No. 2,173,041. Josef Muller, Wissenstein-on-the-Drau, Carinthia, Austria.

Manufacture iron phosphate by electrolytic decomposition of ferro-phosphorus. No. 2,173,103. Lewis H. D. Fraser, Sheffield, Ala.

Process dehydrogenating propanol and butanol, comprising vapor phase contacting with pellets of cuprous oxide at a temperature slightly above 530° F. No. 2,173,111. Rudolph Leonard Hasche, Kingsport, Tenn., to Eastman Kodak Co., Jersey City, N. J.

Manufacture dehydrogenated secondary carbinols, comprising liquid-phase contacting with a metal of the 8th group of the periodic table, at 50-400° C. No. 2,173,114. Benjamin W. Howk, Wilmington, and Wilbur A. Lazier, New Castle County, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Process reacting a lower aliphatic acid with a higher alcohol, to produce an ester having a higher boiling point than the acid, comprising essentially performing the reaction with up to a 300% excess of acid in the initial stage of esterification. No. 2,173,124. Lester W. A. Mever and Frederick R. Conklin, Kingsport, Tenn., to Eastman Kodak Co., Jersey City, N. J.

Manufacture alkyl bromide, comprising heating bromine, alkanol, and sulfur dioxide in the presence of water to form alkyl bromide and sulfuric acid. No. 2,173,133. David J. Pye and Harry H. Purcell, Pittsburgh, Calif., to The Dow Chemical Co., Midland, Mich.

Production of alcohols by hydrating olefins in the presence of a heteropoly acid, in an atmosphere of inert gas. No. 2.173,187. Herbert G. Tanner, Ashley, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Manufacture of carbon monoxide-hydrogen gas mixtures during a process generating also carbon black. No. 2,173,695. Forrest C. Reed, Kansas City, Mo.

Regenerative absorption process recovering sulfur dioxide from waste gases. No. 2,173,877. Arthur Maurice Clark, William Edward Batten, and Charles Frederick Reed Harrison, Norton-on-Tees, England, to Imperial Chemical Industries, Ltd., a corp. of Great Britain.

Production of zinc-free barium hydroxide. No. 2,173,912. Albert Thomas Mertes, Newport, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Process for drying whey by the drum method. No. 2,173,922. George C. Supplee, Bainbridge, N. Y., to The Borden Company, New York City.

Process and apparatus for manufacturing hydrogen from hydrocarbons and steam, all in the vapor phase. No. 2,173,984. James H. Shapleigh, to Hercules Powder Co., both of Wilmington, Del.

Method and apparatus for preparing super-saturated solutions in water with inorganic salts in a finely-divided state. No. 2,173,986. Kenneth E. Stuart, Niagara Falls, N. Y., to Hooker Electrochemical Co., New York City.

Manufacture a cement mortar containing non-foaming polyhydroxy-alkyl organic carboxylic acid. No. 2,174,051. Kaspar Winkler, Lugano-Crocifisso, Casa Crocifisso, Switzerland.

Process for making secondary and tertiary sodium orthophosphates, free of traces of lead and arsenic. No. 2,174,158. Raymond J. Kepfer, Lakewood, and William R. Devor, East Cleveland, Ohio, to E. I. du Pont de Nemours & Co., Wilmington, Del.

Process roasting metal sulfide fines, and recovering the sulfur dioxide therefrom. No. 2,174,185. Bernard M. Carter, Montclair, N. J., to General Chemical Co., New York City.

Air-conditioning apparatus utilizing a solid calcium chloride coolant. No. 2,174,186. Charles R. Downs, Greenwich, Conn., and Joseph W. Spiselman, Brooklyn, N. Y., to The Calorider Corp., Old Greenwich, Conn.

Process for ethylene, generated by cracking high molecular weight hydrocarbons in the presence of steam. No. 2,174,196. Donald Atwater Rogers, Petersburg, Va., to The Solvay Process Co., New York City.

Manufacture acetylacetic acid, comprising reacting diketene with hydroxy amines and urea. No. 2,174,239. Anthony H. Gleason, Elizabeth, N. J., to Standard Oil Development Co., a corp. of Delaware.

Process for alkyl halide manufacture, comprising passing an olefin and a hydrogen halide over a metal halide of the V (periodic) Group, while maintaining in the feed gases 2½-20% of moisture. No. 2,174,278. Ober C. Slotterbeck and Raphael Rosen, Elizabeth, N. J., to Standard Oil Development Co., a corp. of Delaware.

Process yielding butadiene, comprising the catalytic dehydration of butanediol-1,3, yielding butadiene and other products, including water and 1-butenol-4, and fractionally separating therefrom the butadiene. No. 2,174,280. Victor E. Wellman, Silver Lake, O., to The B. F. Goodrich Co., N. Y. City.

Manufacture of olefins from hydrocarbons other than methane, comprising preheating said hydrocarbons to about 700° C., and admitting oxygen under such conditions that a reaction temperature between 700-1000° C. is produced, sufficient to convert substantial amounts of hydrocarbons to unsaturated compounds, including acetylene. No. 2,174,288. Hans Klein, Mannheim, Ferdinand Haubach, Ludwigshafen-on-the-Rhine, and Wilhelm Hofeditz, Mannheim, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Process for finishing shortening materials. No. 2,174,364. Truman M. Godfrey, Winchester, Mass., and Victor Serbell, Leonia, N. J., to Lever Brothers Co., a corp. of Maine.

Process manufacturing sodium tripolyphosphate. No. 2,174,614. Ferdinand Bornemann, Wiesbaden-Biebrich, and Hans Huber, Wiesbaden, Germany.

Continuous process hydrogenating rosin acid materials. No. 2,174,651. Rollin J. Byrkit, Jr., Marshallton, Del., to Hercules Powder Co., Wilmington, Del.

Adsorption apparatus for recovering solvent vapors with activated carbon. No. 2,174,666. Leonard A. Logan, Flushing, N. Y., to Carbide & Carbon Chemicals Corp., a corp. of New York.

Process decomposing alunite into alumina and soluble alkali metal salts. No. 2,174,684. Frank K. Cameron, Chapel Hill, N. C., Ernest O. Huffman, Kingsport, Tenn., and Joseph A. Taylor, Chapel Hill, N. C.

Process manufacturing 1,1,2-trichlorethane, comprising passing ethylene chloride and chlorine into a bath containing about 50% ethylene chloride and 1,1,2-trichlorethane, said bath being exposed to actinic light at a temperature above 50° C. No. 2,174,737. Gerald H. Coleman and Garnett V. Moore, to The Dow Chemical Co., all of Midland, Michigan.

Production concentrated sulfuric acid from hydrogen sulfide and concentrated sludge acid. No. 2,174,739. Peter S. Gilchrist, Charlotte, N. C. and James M. Rumple, Flushing, N. Y., to Chemical Construction Corp., New York City.

Production unsaturated aliphatic carboxylic acid nitriles, by heating a halogenated saturated nitrile above 250° C. in the presence of a substance splitting off hydrogen halide. No. 2,174,756. Kurt Pierch, Ludwigshafen-on-the-Rhine Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Process recovering aluminum compounds from coal screening and washing residues comprising adding a small amount of milk of lime to the residues and calcining in a furnace, the ash being decomposed with boiling hydrochloric acid. No. 2,174,825. Lucien Freling and Jules Dorren, Heerlen, Netherlands.

Method dehydrating a carbinol to the corresponding unsaturated carbonyl compound, by azeotropic distillation in the presence of a dehydrating catalyst. No. 2,174,830. Sumner H. McAllister, Lafayette, and Edwin F. Bullard, Oakland, Calif., to Shell Development Co., San Francisco, Calif.

Preparation of sulfonyl halides, comprising reacting an organic thiocyanate with aqueous halogen. No. 2,174,856. Treat B. Johnson, Bethany, Conn., to Rohm & Haas Co. Philadelphia, Pa.

Production of calcium carbide from lime and oil-bearing carbonaceous fuel. No. 2,174,900. Frederick T. Snyder, Brookline, Mass.

Process yielding esters, from treating a saturated aliphatic monocarboxylic acid with an olefine in the vapor phase, in the presence of a heteropoly acid catalyst. No. 2,174,985. Wilbur A. Lazier, New Castle County, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production of basic copper sulfate, comprising treating a copper salt with an oxidizing gas mixture, while contacting said copper salt with a compound of sulfur and ammonia in water. No. 2,175,132. Marcel Serciron, Dourdan, France.

Filter for removing hydrogen sulfide from air, comprising activated charcoal impregnated with an alkali metal salt of an arsenic oxygen-acid. No. 2,175,190. John C. Goshorn and Paul O. Rockwell, Baltimore, Md.

Catalytic vapor phase process condensing a non-benzenoid acetylene polymer to a cyclic compound, comprising passing the polymer, together with ammonia or a primary amine, over a catalyst at an elevated temperature. No. 2,175,339. Albert S. Carter, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Leather

Manufacture a leather tanning compound, wherein a sulfonated 4,4'-dihydroxy diphenyl is condensed with an aldehyde to yield a water-soluble end product. No. 2,171,806. Alfred Russell and John W. Copenhaver to Rohm & Haas Co., both of Philadelphia, Pa.

Production leather-surfaced articles, comprising applying a bonding surface to a fibrous base, and depositing thereon dry, ground leather, and then finishing the coating with a solution of tannable protein, and then tanning the surface as a whole. No. 2,172,028. Raymond C. McQuiston, West Newton, and Henry C. Hopewell, Newton, Mass.

Conversion animal hide into white leather, comprising first, bleaching, treating with an acid formaldehyde solution and then with alkaline formaldehyde solution, thereafter treating with an alkali metal metaphosphate solution, and finally, with alum tanning solution. No. 2,172,233. John Arthur Wilson, Buford, Ga., to Hall Laboratories, Inc., Pittsburgh, Pa.

Method purifying tannin extract with albumen. No. 2,173,977. Charles R. Oberfell, Lynchburg, Va., to The Mead Corporation, Chillicothe, Ohio.

Manufacture of tanning agents, comprising combining a condensation product of dihydroxy-diphenylsulfone and a sulfite and a formaldehyde compound, together with a ketone-phenol-sulfite formaldehyde condensate. No. 2,174,287. Friedrich-Wilhelm Guthke, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Manufacture a readily dispersable adhesive base, comprising dissolving matter from seed meal in alkaline solution, separating therefrom the

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insoluble matter, and evaporating the filtrate. No. 2,174,438. John F. Corwin and Henry V. Dunham.

Method processing evaporated salt, comprising mixing with the salt mass an aqueous solution of calcium chloride, wherein the chloride and water are present in 0.1-5.0% by weight of the salt present. No. 2,174,450. Marnell Segura, Jefferson Island, La., to Jefferson Island Salt Mining Co., Louisville, Ky.

Preparation of 4,5-dichloro-phthalonitrile. No. 2,174,568. John Stanley Herbert Davies and William Owen Jones, Blackley, Manchester, Eng., to Imperial Chemical Industries, Ltd., of Great Britain.

Process recovering a metal from solution, comprising contacting the solution with the insoluble permanganite of a metal more electropositive than that which is to be recovered, whereby the desired metal is separated as the insoluble permanganite. No. 2,174,570. Albert B. Doran, Los Angeles, Calif.

Manufacture nitrates and chlorinated organicals, comprising reacting nitric acid with metal chloride to form the nitrate and a gaseous mixture containing nitrosyl chloride and chlorine, reacting the former with an organic compound, and then recovering the residual chlorine and nitric oxide. No. 2,174,574. Mayor Fathing Fogler, Prince George County, Va., to The Solvay Process Co., New York City.

Method extinguishing fires in flammable solvents, comprising throwing into the burning liquid bodies of solid carbon dioxide which, submerging, vaporize to form a thick layer of smothering gas directly on the burning surface. No. 2,174,606. Xavier B. Tansill, N. Y. City.

Metals and Alloys

Preparation a copper alloy containing about 0.05-3.00% magnesium and 0.05-15.00% silver. No. 2,171,697. Franz R. Hensel and Earl I. Larsen, to P. R. Mallory & Co., Inc., both of Indianapolis, Ind.

Preparation a cobalt casting alloy for dentures, containing 0.5-15.0% boron, 1-30% titanium, and 3-45% chromium. No. 2,171,744. Cornell Joel Grossman, Millburn, N. J.

Method refining copper, comprising reacting molten copper with phosphorus in the presence of an added metal, iron or aluminum. No. 2,172,009. Herman C. Kenny, Lake Linden, Mich., to Calumet & Hecla Consolidated Copper Co., of Michigan, Boston, Mass.

Pickling solution for chromium alloys, comprising a solution containing ½-10% hydrofluoric acid, 5-20% chromic acid and 1-10% sulfuric acid, parts by volume in water. No. 2,172,041. Stephen F. Urban, Chicago, Ill.

Bright-plating bath, for copper surfaces, containing 80-20 parts conc. sulfuric acid, 20-80 parts conc. nitric acid, a chloride in amount equivalent to 0.1-10.0 parts conc. hydrochloric acid, and from 5-200 parts chromic acid. No. 2,172,171. Walter R. Meyer, Milford, and Michael F. Dunleavey, Bridgeport, Conn., to General Electric Co., a corp. of New York.

Method plating on an article a bright, heavy coating of chromium. from a chromic acid solution containing about 250 gms. chromic acid and 1-5 gms. sulfate per liter, comprising passing a current of at least 2 amps./liter at 40-90° C. No. 2,172,344. Morris Brown, LaGrange, Arthur M. Wagner, Riverside, and William Yonkman, Chicago, to Western Electric Co. Inc., New York City.

Process deep-etching ferrous alloys with an appropriate solvent, such that the resulting surface is quite free of pitted areas. No. 2,172,421. Herbert Henry Uhlig, Cambridge, Mass., to The Chemical Foundation, Inc., New York City.

Method making nickel and manganese stainless steels resistant to pit corrosion, comprising forming an adherent and compacted film of silver thereupon, and then treating the silver-coated film with a compound forming an insoluble silver salt. No. 2,172,422. Herbert Henry Uhlig, Cambridge, Mass., to The Chemical Foundation, Inc., New York City.

Method reducing the pit corrosion susceptibility of passive ferrous alloys, comprising annealing and then treating with a sulfuric-hydrochloric acid solution to form a chemically perfect new surface free of pit corrosion foci. No. 2,172,428. John C. Wulff and Herbert Henry Uhlig, Cambridge, Mass., to The Chemical Foundation, Inc., New York City.

Palladium alloy, containing 1½-1¾ parts aluminum, 10-15 parts copper, and 30-45 parts silver. No. 2,172,512. James A. Kilgallon, Chicago, Ill.

Iron alloys for electrical purposes, containing 20-30% nickel, 10-20% cobalt, and having undesirable impurities in amount less than 0.3%. No. 2,172,548. Paul Schwarzkopf, Reutte, Austria.

Magnetic material for use in powder cores, comprising an iron alloy containing 7-9% silicon and 6-11% manganese. No. 2,172,626. Jacob Louis Snoek, Eindhoven, Netherlands, to N. V. Philips' Gloeilampenfabrieken, Eindhoven, Netherlands.

Copper alloy, containing 0.5-2.5% beryllium and 0.1-1.0% cobalt. No. 2,172,639. Werner Hessenbruch, Hanau-on-the-Main, Germany, to Heraeus-Vacuumschmelze, A. G., Hanau-on-the-Main, Germany.

Nickel alloy for electrodes of an electric discharge tube, containing 0.05-3.0% zirconium. No. 2,172,967. Jan Hendrik de Boer and Gottfried Bruno Jonas, Eindhoven, Netherlands, to N. V. Philips' Gloeilampenfabrieken, Eindhoven, Netherlands.

Preparation elemental silicon from silicofluoride salts, comprising mixing the latter with at least 1 finely divided metal more electropositive than silicon and reacting said mixture at 500-1000° C., under nitrogen; on acidulating the residue, amorphous silicon (96-97%) is recovered. No. 2,172,969. Josef Eringer, Munich, Germany.

Process separating metals from a fluid ore pulp, comprising treating the pulp in aqueous electrolyte to the action of materials forming a voltaic couple, such that the valuble matter adheres to only one of the members of the couple. No. 2,173,090. John Allingham, one-half to William N. Rossberg, Los Angeles, Calif.

Preparation a free-flowing metallic powder composition containing throughout a liquid nonreactive with the metal powder, in a quantity about 0.0025-0.03% by weight. No. 2,173,100. Joseph E. Drapeau, Jr., Calumet City and James O. Johnstone, Chicago, Ill., to The Glidden Company, Cleveland, Ohio.

Preparation an electric fuse metal for fuses, comprising a body of magnesium metal having an outer sheath of tightly-fitting metal that is a good conductor. No. 2,173,200. Eduard Grunwald, Nuremberg, Germany, one-half to Helmut Lenk Nuremberg-Reichelsdorf, Germany.

Method deoxidizing steel baths, comprising adding to the finished steel in the ladle a mixture of 40-60% calcium carbide and 60-40 fluorspar. No. 2,173,205. Otto Johannsen, Volklingen, Saar, Germany, to Rochling's Eisen-und Stahlwerke Gesellschaft mit beschrankter Haftung Volklingen, Saar, Germany.

Preparation of beryllium fluoride free from oxide, comprising heating in an inert atmosphere a stoichiometric mixture of ammonium acid fluoride and beryllium hydroxide. No. 2,173,290. Carlo Adamoli, Milan, Italy, to Perosa Corp., Wilmington, Del.

Iron-silicon alloy of energy loss characteristics approximately equal to 0.48-0.60 W/kg., being a vacuum-purified iron alloy containing 2-5% silicon and up to 0.80% of a metal from the group: copper, aluminum, zirconium, and titanium. No. 2,173,312. Wilhelm Rohn and Werner Hessenbruch, to Heraeus-Vacuum-schmelze A. G., both of Hanau, Germany.

Method impregnating a weld with refractory diamond substitutes such as tungsten carbide, silicon carbide, and the like. No. 2,173,484. Robert L. Lerch, Glendale, Calif., and William A. Wissler, Niagara Falls, N. Y., to the Haynes Stellite Co., a corp. of Indiana.

Process recovering and converting manganese dust from ferro-manganese blast furnaces into a utilizable form for resmelting. No. 2,173,535. Charles B. Francis, Pittsburgh, Pa.

Process recovering zinc values from galvanizers' skimmings. No. 2,173,876. Robert J. Campbell. So. Ardmore, Pa., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Manufacture of high-carbon steel alloys containing the refractory ferrous metals as alloying elements, said alloys having improved forgeability and hardening characteristics. Nos. 2,174,281-6. James P. Gill, Latrobe, Pa., to Vanadium-Alloys Steel Co., Latrobe, Pa.

Heat-resisting ferrous alloy, containing 10-30% chromium, 0.01-2.00% thorium, 0.25-3.00% silicon, and 0.01-2.00% cerium. No. 2,174,919. William Marriott Kay, Manchester, Eng.

Method for removing magnesium from aluminum-magnesium alloys, comprising treating such alloys with chlorine above the melting point of magnesium chloride, but not over about 1000° C., and separating the magnesium chloride. No. 2,174,926. Georg Messner, Bitterfeld, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Manufacture an extrudable and workable sheathing alloy containing lead, bismuth, and lithium. No. 2,175,279. Hans Osborg, New York City to Maywood Chemical Works, Maywood, N. J.

Paper & Pulp

Apparatus removing water from wood pulp, cellulose, or the like. No. 21,201. Reissue. Olaf Qviller, Oslo, Norway, to Fibre Making Processes, Inc., Chicago, Ill.

Process manufacturing a stable casein emulsion, containing also a waxy material and a small amount of colloidal protein emulsifying agent. No. 2,172,392. Otto Kress and Charles E. Johnson, Appleton, Wisc., to The Institute of Paper Chemistry, Appleton, Wisc.

Manufacture a paper liner for use in contact with a tacky rubber surface, comprising deeply impregnating strong paper web with a fluid composition containing organic adhesive and plasticizer therefor, and then coating the treated paper with a starch filler. No. 2,173,097. George W. Coggeshall, Yarmouth, Maine. to S. D. Warren Co., Boston, Mass.

Production a coated, absorbent paper, comprising priming and coating the paper with a coating composition forming a completely flexible film that will not crack or wrinkle when the paper is bent or creased tightly. No. 2,173,129. Nicholas E. Oglesby, Troy, N. Y.

Manufacture paper stock from sulfite or soda pulp containing 20% or more of ground wood pulp. No. 2,173,167. Rexford William Hovey, Bronxville, N. Y., to Oxford Paper Co., a corp. of Maine.

Abrasive coated paper, comprising paper backing softened with triethanolamine oleate, and coated with abrasive grit held in water-soluble adhesive. No. 2,173,796. Nicholas E. Oglesby, to Behr-Manning Corp., both of Troy, N. Y.

Manufacture a paper-stock resistant to splitting or lamination. No. 2,173,829. Richard Gurley Drew, to Minnesota Mining & Manufacturing Co., both of St. Paul, Minn.

Manufacture a non-glaring, tinted paper stock from mixed soda and sulfite pulp colored with a trace of yellow-blue paper dyestuff. No. 2,174,095. Wellington G. Reynolds, South Hadley Falls, Mass., to Reynolds Mfg. Co., Holyoke, Mass.

Petroleum

Process degumming cracked hydrocarbon vapors, comprising essentially catalytically contacting said vapors with a solid, adsorbent material to polymerize said gum-forming constituents. No. 2,172,436. Horace B. Cooke, Alexandria, Va., and Malvin R. Mandelbaum, New York City, to The Gray Processes Corp., Newark, N. J.

Process manufacturing lubricating oils from products obtained by hydrogenating carbon monoxide and then polymerizing the resulting unsaturated hydrocarbons by contacting with a metal halide catalyst. No. 2,172,441. Herbert Goethel, Duisberg-Hamborn, and Heinrich Tramm, Oberhausen-Holten, Germany.

Method and apparatus for refining low-boiling liquid hydrocarbons. No. 2,172,513. Hans Olof Lindgren, Appelviken, Sweden, to The De Laval Separator Co., New York City.

Process dehydrogenating hydrocarbons, comprising stripping with aluminum oxide containing a small amount of alkali metal oxide. No. 2,172,534. Aristid V. Grosse, to Universal Oil Products Co., both of Chicago, Ill.

Method dehydrogenating aliphatic hydrocarbons to produce aromatic compounds, comprising stripping the former over a mixture of oxides of vanadium, chromium, and molybdenum, at 400-700° C., for from 0.1-20.0 seconds. No. 2,172,535. Aristid V. Grosse and Jacque C. Morrell, to Universal Oil Products Co., all of Chicago, Ill.

Production aromatic hydrocarbons from aliphatic alcohols of at least 6 carbon atoms in straight chain arrangement, comprising contacting the alcohol with a mixture of dehydrating catalyst and a dehydrogenating catalyst. No. 2,172,540. Vasili Komarewsky, to Universal Oil Products Co., both of Chicago, Ill.

Conversion normally gaseous olefins into liquid olefin polymers, comprising polymerizing the olefins, in the presence of a solid pyrosulfate salt, at an appropriate temperature. No. 2,172,542. Jacque C. Morrell, to Universal Oil Products Co., both of Chicago, Ill.

Process manufacturing high anti-knock motor fuel, comprising stabilizing cracked naphtha thereby removing constituents of less than 5 carbon atoms and yielding butanes and olefines capable of being reacted with sulfuric acid to form a higher, gasoline-type fraction. No. 2,172,560. Lebbeus C. Kemp, Port Arthur, Tex., and Rufus L. Savage, Jr., Hartsdale, N. Y., to The Texas Company, New York City.

Process obtaining valuable organic compounds from chemically neutralized sludge derived from mineral oil refining, comprising melting the

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fusible organic constituents by heating the sludge to 200-300° C., and withdrawing the molten compounds from the inorganic residue. No. 2,172,784. Karl Bauer, Waclaw Junosza v. Piotrowski, Hugo Burstin, and Jozef Winkler, Drohobycz, Poland.

Method and apparatus for making oxidized asphalt, by blowing the hot liquid asphalt in a circulating tower. No. 2,172,821. Philip Subkow, to Union Oil Co., of California, both of Los Angeles, Calif.

Preparation of isobutenyl amines. No. 2,172,822. Miroslav W. Tamele, Oakland, and Herbert P. A. Groll, Berkeley, Calif., to Shell Development Co., San Francisco, Calif.

Preparation a catalyst converting cracked hydrocarbon vapors to motor fuel, comprising: equal (27) parts of carnotite, phosphate rock, and Floridan clay, 5 parts zinc phosphate, 4 parts barium chloride, and 10 parts of fire bond. No. 2,173,375. James R. Rose, Edgeworth, Pa.

Catalyst for polymerizing mixed saturated and unsaturated hydrocarbon gases to produce motor fuel liquids, comprising phosphate rock (10-50 parts), Floridan clay (10-50 parts), zinc phosphate (5-30 parts), barium halides (5-30 parts), water glass (10-40 parts), and the remainder carnotite. No. 2,173,376. James R. Rose, Edgeworth, Pa.

Process for making high anti-knock motor fuel, comprising essentially contacting olefins with cool conc. sulfuric acid by a counter-current contacting method. No. 2,173,452. Sylvan R. Merley, Riverton, N. J., to Power Patents Co., Hillside, N. J.

Process converting normally gaseous hydrocarbon fractions into normally liquid gasoline-type fractions, comprising essentially thermally treating the former under pressure. No. 2,173,456. Pike H. Sullivan, to Process Management Co., both of New York City.

Method dewaxing hydrocarbon oils at -25° to -125° C. No. 2,173,460. Willem Rhijnvis van Wijk, Amsterdam, Willem Johannes Dominicus van Dijck, The Hague, and Abel Johannes Cornelis Bart, Amsterdam, Netherlands, to Shell Development Co., San Francisco, Calif.

Preparation a wood charcoal carrier for a catalyst polymerizing the lower olefine hydrocarbons to valuable liquid motor fuel, said charcoal carrier having, at grain size 2-4mm., a filling weight of not over 20 gms./100 cc. No. 2,173,482. Emil Keunecke, Oppau, and Wilhelm Muench, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Multiple-stage contact extraction method for purifying petroleum oil. No. 2,173,915. David F. Renshaw, Olean, N. Y., to Socony-Vacuum Oil Co., Inc., New York City.

Process recovering sodium and other values from spent soda used in petroleum refining, comprising essentially conversion with carbon dioxide to bicarbonates and the like. No. 2,174,023. Hans G. Vesterdal, Linden, N. J., to Standard Oil Development Co., a corp. of Delaware.

Process simultaneously cracking and polymerizing hydrocarbon vapors containing both saturated and unsaturated lower olefines, to produce motor fuel-type saturated hydrocarbons. No. 2,174,024. Peter J. Wiezevich, Elizabeth, N. J. now by judicial change of name, Peter J. Gaylor, to Standard Oil Development Co., a corp. of Delaware.

Preparation a well drilling fluid, containing an alginate. No. 2,174,027. Robert J. Ball, Los Angeles, Calif.

Preparation alkylated polychloraromatic hydrocarbon mixtures from cracked olefin-bearing petroleum gases contacted with aromatic chlorinated hydrocarbons in the presence of a Friedel-Crafts catalyst. No. 2,174,069. Robert R. Dreisbach, to The Dow Chemical Co., both of Midland, Mich.

Continuous process neutralizing a cracked hydrocarbon distillate carrying a sulfur acid and alkyl phenols. No. 2,174,174. Bernard Sutro Greensfelder, San Francisco, and Monroe Edward Spaght, Wilmington, Calif., to Shell Development Co., San Francisco, Calif.

Process manufacturing wax modifiers, comprising chlorinated paraffines condensed with aromatic compounds by a Friedel-Crafts reaction. No. 2,174,246. Eugene Lieber, Linden, and Martin M. Sadlon, Roselle Park, N. J., to Standard Oil Development Co., a corp. of Delaware.

Production of olefin polymers from olefin-bearing hydrocarbon gases contacted with a strong mineral acid of sulfur at 55-80% concentration. No. 2,174,247. Sumner H. McAllister, Lafayette, Cal., to Shell Development Co., San Francisco, Calif.

Method for continuous desulfurizing of hydrocarbon vapors, comprising passing over a sulfur-sensitive metal catalyst, in an atmosphere of hydrogen, at elevated temperatures and pressures. No. 2,174,510. Marion H. Gwynn, Leonia, N. J.

Manufacture a Diesel fuel, comprising dissolving acetic anhydride in a hydrocarbon Diesel fuel, and oxidizing the anhydride in situ to diacetyl peroxide. No. 2,174,680. Darwin E. Badertscher and George S. Crandall, Woodbury, N. J., to Socony-Vacuum Oil Co., Inc., New York City.

Method refining mineral oil mixtures containing both high- and low-viscosity oils, comprising extraction with a cyclic organic oxide, the latter forming a raffinate with the high-viscosity component. No. 2,174,765. Ernst Terres, Berlin, Germany, and Josef Moos, New York, and Erich Saegebarth, Jackson Heights, N. Y., to Edeleanu Gesellschaft, m.b.H., a corp. of Germany.

Method of sweetening hydrocarbon oil, comprising removing the mercaptans with metallic copper in the presence of a hydrogen halide, at a temperature below 200° F. No. 2,174,810. George Hugo von Fuchs and Lawson Elwood Border, Wood River, Ill., to Shell Development Co., San Francisco, Calif.

Mechanical roller method for separating petroleum emulsions of water in oil. No. 2,174,849. Jesse V. Stevens, Sapulpa, Okla.

Process for thermal conversion of high-boiling hydrocarbons into lower-boiling fractions at elevated pressure. No. 2,174,858. Percival C. Keith, Jr., Peapack, N. J., to Gasoline Products Co., Inc., Newark, N. J.

Manufacture of alkyl isobutanes, by passing ethylene into isobutane at a temperature below 40° C., in the presence of aluminum chloride and hydrogen chloride, there being present also an activating amount of olefin of greater activity than ethylene. No. 2,174,883. Vladimir Ipatieff and Herman Pines, to Universal Oil Products Co., all of Chicago, Ill.

Process for degumming motor-fuel type hydocarbons, in the presence of an acid of phosphorus. No. 2,174,908. Waldo C. Ault and Carroll A. Hochwalt, Dayton, Ohio, to Monsanto Chemical Co., St. Louis, Mo.

Process dewaxing mineral hydrocarbon oils, comprising shock-chilling the oil to separate the waxy constituents, and completing the separation by electrodeposition of the waxy particles on a submerged electrode surface. No. 2,174,938. Lyle Dillon and Claude E. Swift, Glendale, Calif., to Union Oil Co., of California, Los Angeles, Calif.

Method treating an oil well, comprising introducing into the calcareous structure under pressure an aqueous solution of a weak acid having an ionization constant between 8.59×10^{-8} and 1.55×10^{-3}. No. 2,175,079. Willard H. Dow to The Dow Chemical Co., both of Midland, Mich.

Method treating a well, comprising introducing into the well strong mineral acid containing sulfurous acid. No. 2,175,081. John J. Grebe, to The Dow Chemical Co. both of Midland, Mich.

Method treating a well with aqueous hydrochloric acid to increase the production thereof, comprising introducing into the well said acid solution which contains a small proportion of an acid of the group including lactic acid, glycerine, glycollic acid, and citric acid. No. 2,175,095. Sylvia M. Stoesser, to The Dow Chemical Co., both of Midland, Mich.

Method increasing the melting point of bituminous petroleum material, comprising admixing said material with caustic soda and heating the mixture to about 600-700° F. No. 2,175,189. James E. Gambrill, Drexel Hill, Pa., to The Atlantic Refining Co., Philadelphia, Pa.

Thermal cracking process for converting high-boiling petroleum hydrocarbons into motor fuel-type hydrocarbons. No. 2,175,180. Helge C. Dieserud, Montclair, N. J., to The Texas Co., New York City.

Pigments

Manufacture a coherent, fixed zirconium silicate, comprising zirconium silicate bonded with a minor quantity of a double silicate of zirconium and one of the metals of the group including the alkali and alkaline earth metals and magnesium. No. 21,224. Reissue. Charles J. Kinzie, Niagara Falls, N. Y., to Titanium Alloy Mfg. Co., N. Y. City, a corp. of Maine.

Blue print coating composition, comprising a light-sensitive ferric salt, a soluble ferricyanide and a quaternary ammonium compound in effective amount. No. 2,172,319. Garnet Philip Ham, Old Greenwich, Conn., to American Cyanamid Co., New York City.

Method coloring the surface of an alloy steel of at least 7% chromium content, comprising treating with a sulfuric acid solution containing a soluble oxygen compound of vanadium. No. 2,172,353. Clements Batcheller, Glens Falls, N. Y., to Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

Printing ink for printing on transparent strips, comprising a coloring material dispersed in a non-hygroscopic solvent plasticizer of the group including triacetin, ethyl toluene sulfonamide, dimethyl phthalate, dibutyl tartrate, and monomethyl xylene sulfonamide. No. 2,172,465. Millard Demarest, Hackensack, and Kirtland Flynn, East Orange, N. J., to Celluloid Corp., a corp. of New Jersey.

Manufacture a pigment of titanium oxide and 0.15% to about 1% of phthalic anyhydride. No. 2,172,505. Henry A. Gardner, Washington, D. C.

Apparatus producing sized ceramic particles. No. 2,172,638. Earnest T. Hermann, El Segundo, Calif.

Preparation a highly porous decolorizing agent, comprising the reaction product of alkaline earth carbonate, finely-divided silicious matter, and water, having at least 50% of the alkaline earth content in combination with silica. No. 2,173,085. Arthur B. Cummins, Plainfield, N. J., to Johns-Manville Corp., New York City.

Process improving the color of off-color cadmium sulfo-selenide pigments. No. 2,173,128. James J. O'Brien, Baltimore, Md., to The Glidden Co., Cleveland, Ohio.

Manufacture lead chromate pigments. No. 2,173,457. Omar F. Tarr and Winslow H. Hartford, Baltimore, Md., to Mutual Chemical Co. of America, New York City.

Color lake for printing inks, comprising principally a water-insoluble phthalocyanine coloring material intimately associated with a resinate of a metal of the 2nd periodic group, below that of mercury. No. 2,173,699. Alfred Siegel, Rosella, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production a fog or mist by partial, flameless combustion of higher fatty materials or higher organic cyclic hydrocarbons in the presence of metallic oxide catalyst in contact with air. No. 2,173,756. Paul Kronenberg, Berlin, Germany.

Production insoluble sulfide pigments. No. 2,173,895. James Eliot Booge, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Method activating clay particles, comprising treating its aqueous suspension with sulfur dioxide and chlorine gas. No. 2,174,610. James W. Weir, Los Angeles, Calif., one-third to Henry S. Montgomery, South Pasadena, Calif.

Colored pigment for gravel, shale, and the like, comprising 8-20% color base, 25-50% calcium sulfate, 5-10% boiled linseed oil, 15-30% resin varnish, 10-20% pilchard oil, and 1-4% cobalt drier. No. 2,174,632. Ernest George Hewish, Winnipeg, Manitoba, Canada, one-half to Carl Buchholz, Churchhill, Manitoba, Canada.

Manufacture a titanium dioxide-alkaline earth metal sulfate pigment, the former being a finely divided product obtained from the hydrolysis of titanium tetrafluoride; size of all the particles being less than 0.50 micron. No. 2,174,920. Max H. Kliefoth, Madison, Wis., to The Sherwin-Williams Co., Cleveland, Ohio.

Process for wet-milling azo pigments prior to the coupling step. No. 2,174,954. Vincent C. Vesce, New York City, to Harmon Color Works, Inc., Haledon, N. J.

Resins, Plastics, etc.

Process reacting monomeric acrylamides with lower molecular weight aldehydes, thereby obtaining a condensation product. No. 2,173,005. Daniel E. Strain, Wilmington, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation a granular plastic from alkali metal sulfide dissolved in water, together with free sulfur, the suspension being treated with formaldehyde at 90° C. No. 2,174,000. Robert C. Hills and Maxwell M. Barnett.

Manufacture a hydrocarbon-soluble urea-formaldehyde resin. No. 2,174,012. Sydney Leonard Morgan Saunders, Whetstone, London, and Leonard Winston Coveney, Leytonstone, London, England.

Process manufacturing stable, fiber-forming substances from the interaction of polymethylene diamines with polymethylene dicarboxylic acids; filament produced shows definite molecular orientation under the X-Ray. No. 2,174,527. Wesley Rasmus Peterson, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Process manufacturing clear, moldable urea-formaldehyde condensation products. No. 2,174,535. Leonard Smidth, Philadelphia, Pa.

Polystyrene plastic composition, comprising styrene plasticized with an alkyl ether of a polymethylene-derivative ester of salicylic acid. No. 2,174,538. Sylvia M. Stoesser and Arnold R. Gabel, to The Dow Chemical Co., all of Midland, Mich.

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Method stabilizing plasticized gamma-polyvinyl chloride, comprising incorporating water glass therein on a hot mill. No. 2,174,545. Claude H. Alexander, Cuyahoga Falls, Ohio, to The B. F. Goodrich Co., New York City.

Preparation reaction products of equimolar proportions of bifunctional polyamide-forming compounds. No. 2,174,619. Wallace Hume Carothers, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Preparation a condensation product of a substance of the group: urea, thiourea, and gelatine, with an alkylene oxide and an aldehyde of 8-20 carbon atoms. No. 2,174,747. Albert Frank Bowles, Jersey City, and Saul Kaplan, Teaneck, N. J., to The Richards Chemical Works, Inc., Jersey City, N. J.

Manufacture abrasive articles, comprising mixing abrasive granules with a resinous coating liquid and a pulverized reactive resin, and allowing said mixture to dry, allowing the coating liquid and resin to react, forming a dry, moldable plastic mix. No. 2,174,755. Emil E. Novotny, Philadelphia, Pa., to Durite Plastics, Inc., Philadelphia, Pa.

Production condensation products from carboxylic acids and amines, comprising reacting same with an alkylene oxide which carries a substituent group capable of forming a water-soluble derivative. Nos. 2,174,760-2. Hermann Schuette, Mannheim, and Max Wittwer, Ludwigshafen-am-Rhine, to I. G. Farbenindustrie, A. G., Frankfort-am-Main, Germany.

Method increasing the vegetable oil solubility of phenol-formaldehyde resins, comprising heating the resins in an inert gas, in the absence of other added substances. No. 2,174,819. William H. Butler, Palisades Park, N. J., to Bakelite Corp., New York City.

Plasticized composition, comprising gamma polyvinyl chloride and a heterocyclic aryl compound containing 2 sulfur atoms in the nucleus. No. 2,175,048. Claude H. Alexander, Cuyahoga Falls, Ohio, to The B. F. Goodrich Co., New York City.

Gamma-polyvinyl chloride, with which is incorporated litharge and a thianthrene. No. 2,175,049. Claude H. Alexander, Cuyahoga Falls, Ohio, to The B. F. Goodrich Co., New York City.

Preparation a butadiene -1,3 polymerizate containing a sulfide of an alkylated phenol. No. 2,175,082. Harro Hagen, Leverkusen-Kuppersteg, Ingofroh Dennstedt, Cologne-Buchforst, and Wilhelm Becker, Cologne-Mulheim, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Manufacture viscous oils from saturated aliphatic nitriles of at least 5 carbon atoms, and from unsaturated higher fatty oils, by condensing same with aluminum chloride. No. 2,175,092. Anderson W. Ralston, to Armour & Co., both of Chicago, Ill.

Improved method dispersing rubber hydrochloride in organic solvents, comprising first fluxing the rubber with a resin soluble in the solvent concerned, rolling the mixture into thin sheets, and treating the latter with hydrogen chloride. No. 2,174,673. Herbert A. Winkelmann, to Marbon Corp., both of Chicago, Ill.

Vulcanizable rubber composition, comprising a rubber hydrochloride, acid-neutralizing ingredients and a plasticizer, phthalyl glycollate or glycol phthalate. No. 2,174,674. Herbert A. Winkelmann, to Marbon Corporation, both of Chicago, Ill.

Manufacture oil-soluble resins, comprising reacting essentially amyl phenol, phenol, formaldehyde, and a monoglyceride of a drying oil acid. No. 2,175,215. Israel Rosenblum, Jackson Heights.

Thermoplastic molding composition, comprising shellac, zinc oxide, and an oxide of an alkaline earth metal or lead. No. 2,175,232. Robert V. Townsend, Arlington, N. J., and Weaver R. Clayton, New York City, to William Zinsser & Co., New York City.

Production condensation products, comprising condensing a phenol, an olefine and a low molecular weight alkanal selected from the group of formaldehyde and its polymers, with the aid of perchloric acid. No. 2,175,393. Winfrid Hentrich, Dusseldorf-Reisholz, and Fritz Schlegel, Dusseldorf, Ger., to Henkel & Cie. G. m. b. H., Dusseldorf-Holt-Hausen Ger.

Textiles

Method and apparatus for drying cellulose acetate or like material in a continuous system. No. 2,171,652. Clifford I. Haney, Drummondville, Quebec, Canada, to Celanese Corp. of America, a corp. of Delaware.

Method manufacturing a patterned fabric from nitrated cellulosic material. No. 2,172,443. Georges Heberlein and Georg Heberlein, Wattwil, St. Gallen, Switzerland, to Heberlein Patent Corp., N. Y. City.

Method developing images on a diazo layer developable with steam. No. 2,172,783. Roelof Jan Hendrik Alink and Johannes Aninga, Eindhoven, Netherlands, to N. V. Philips' Gloeilampenfabriken, Eindhoven, Netherlands.

Method dyeing synthetic textile fabrics while in the package form, with a diazotizable amine and then with an arylamide of oxynaphthoic acid, comprising introducing the dye components in a mixture of organic solvents. No. 2,173,178. Robert Wighton Moncrieff and Albert William Mortimer Cooke, Spondon, near Derby, Eng., to Celanese Corp. of America, a corp. of Delaware.

Preparation a cuprous xanthate of a lower alkyl ether of ethylene glycol. No. 2,173,383. Roscoe H. Carter, Washington, D. C., to the free use of the People of the United States of America.

Preparation a cuprous xanthate of a lower monoalkyl ether of diethylene glycol. No. 2,173,384. Roscoe H. Carter, Washington, D. C., to the free use of the People of the United States.

Process and apparatus making cellulose xanthate. No. 2,174,056. Teunis Dokkum, Arnhem, Netherlands, to American Enka Corp., Enka, N. C.

Manufacture textile assistants, comprising reacting acyloins with a sulfating agent, at about 0° C. No. 2,174,127. Clyde O. Henke, Wilmington, Del., and Joseph L. Richmond, Woodstown, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production textile chemicals, comprising reacting an alkoxy-cyclohexanol with a sulfating agent at a low temperature. No. 2,174,131. Herbert A. Lubs, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Process treating a cellulose fabric with a concentrated sulfuric acid solution of urea, to produce a parchmentized surface on the surface of said fabric. No. 2,174,534. Joseph Harrel Shipp, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Preparation a textile softening agent, comprising the alkali metal or ammonium salt ... an unsulfonated aryl dicarboxylic acid, the other carboxyl group being esterified with an alcohol of at least 8 carbon atoms in a straight chain. No. 2,175,101. Otto Albrecht, Basel, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Process increasing the crease resistance of textiles, comprising incorporating in the fabrics an aldehyde, or aldehydic compound, and an alkyl ester of a higher fatty acid selected from the group consisting of the methyl, ethyl, propyl, butyl and amyl esters of an acid of the group consisting of lauric, myristic, oleic, palmitic, stearic, and ricinoleic acids, and heating the materials so treated to develop the crease-resistance thereof. No. 2,175,183. Henry Dreyfus, London, and Donald Finlayson and Richard Gilbert Perry, Spondon, near Derby, Eng., to Celanese Corp. of America, a corp. of Delaware.

Water, Sewage, etc.

Conversion of lignite or peat bodies into a zeolitic material, comprising treating lignite or bodies with hot aqueous ingredients forming the sulfite or bisulfite addition compound with formaldehyde or acetaldehyde. No. 2,172,301. Walther Sutterlin, Bitterfeld, and Hans Wassenegger, Dessau in Anhalt, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Manufacture ferric sulfate by action of sulfuric acid upon ferric oxide. No. 2,173,144. William S. Wilson, Brookline, and John F. White, Medford, Mass., to Monsanto Chemical Co., a corp. of Delaware.

Process and apparatus for thickening and screening sewage sludges. No. 2,174,873. John R. Downes, Middlesex, and Thomas R. Komline, Dunellen, N. J.

. . . but best of all is the Chemistry of Christmas

Christmas is a catalyst to cause the reaction in human hearts that — for a golden time — makes mankind fellowmen.

Christmas is an activator that penetrates congealed emotions, making them fluid, living, expressive again.

Christmas is an adsorptive that brings together again, in thought or in person, the scattered fragments of former happy friendships.

Christmas is a dispersing agent that sends, widespread, not only good will but the expressive and cherished tokens of good will.

And Your Christmas. May it be in saturate solution — a concentrate of all the kindly chemistry of Christmas — is the sincere wish of

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